



DEPARTMENT OF ENERGY

10 CFR Parts 429 and 430

[EERE-2016-BT-TP-0023]

RIN 1904-AD70

Energy Conservation Program: Test Procedure for Television Sets

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Notice of proposed rulemaking and request for comment.

SUMMARY: The U.S. Department of Energy (“DOE”) proposes to amend the test procedures for television sets to incorporate by reference the relevant updated industry standard. DOE has tentatively determined that the proposed updates would result in a test procedure that is more representative of the average energy use of television sets. DOE is seeking comment from interested parties on the proposal.

DATES: DOE will accept comments, data, and information regarding this proposal no later than [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. See section [V], “Public Participation,” for details. DOE will hold a webinar on Wednesday, April 6, 2022, from 1:00 p.m. to 4:00 p.m. See section V, “Public Participation,” for webinar registration information, participant instructions, and information about the capabilities available to webinar participants. If no participants register for the webinar, it will be cancelled.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *www.regulations.gov*. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE-2016-BT-TP-0023, by any of the following methods:

1. *Federal eRulemaking Portal:* *www.regulations.gov*. Follow the instructions for submitting comments.
2. *E-mail:* to *televisions2016tp0023@ee.doe.gov*. Include docket number EERE-2016-BT-TP-0023 in the subject line of the message.

No telefacsimiles (“faxes”) will be accepted. For detailed instructions on submitting comments and additional information on this process, see section V of this document.

Although DOE has routinely accepted public comment submissions through a variety of mechanisms, including postal mail and hand delivery/courier, the Department has found it necessary to make temporary modifications to the comment submission process in light of the ongoing coronavirus 2019 (“COVID-19”) pandemic. DOE is currently suspending receipt of public comments via postal mail and hand delivery/courier. If a commenter finds that this change poses an undue hardship, please contact Appliance Standards Program staff at (202) 586-1445 to discuss the need for alternative arrangements. Once the COVID-19 pandemic health emergency is resolved, DOE anticipates resuming all of its regular options for public comment submission, including postal mail and hand delivery/courier.

Docket: The docket, which includes *Federal Register* notices, public meeting attendee lists and transcripts (if a public meeting is held), comments, and other supporting documents/materials, is available for review at *www.regulations.gov*. All documents in the docket are listed in the *www.regulations.gov* index. However, some documents listed

in the index, such as those containing information that is exempt from public disclosure, may not be publicly available.

The docket web page can be found at www.regulations.gov/docket/EERE-2016-BT-TP-0023. The docket web page contains instructions on how to access all documents, including public comments, in the docket. See section V for information on how to submit comments through www.regulations.gov.

FOR FURTHER INFORMATION CONTACT:

Mr. Jeremy Domm, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE-2J, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 506-9870. E-mail: ApplianceStandardsQuestions@ee.doe.gov.

Ms. Celia Sher, U.S. Department of Energy, Office of the General Counsel, GC-33, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 287-6122. E-mail: celia.sher@hq.doe.gov.

For further information on how to submit a comment, review other public comments and the docket, or participate in a public meeting (if one is held), contact the Appliance and Equipment Standards Program staff at (202) 287-1445 or by e-mail: ApplianceStandardsQuestions@ee.doe.gov.

SUPPLEMENTARY INFORMATION:

DOE proposes to incorporate by reference the following industry standard into part 430:

Copies of ANSI/CTA-2037-C can be obtained from: Consumer Technology Association. 1919 S Eads Street, Arlington, VA 22202, 703-907-7600, or by going to www.cta.tech.

For a further discussion of this standard, see section IV.M of this document.

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I. Authority and Background

Television sets (“TVs”) are included in the list of “covered products” for which DOE is authorized to establish and amend test procedures. (42 U.S.C. 6292(a)(12))

DOE’s current test procedure for TVs is codified at title 10 of the Code of Federal Regulations (“CFR”) part 430, subpart B, appendix H, “Uniform Test Method for Measuring the Power Consumption of Television Sets” (“appendix H”). DOE has not established energy conservation standards for TVs. The following sections discuss DOE’s authority to establish test procedures for TVs and relevant background information regarding DOE’s consideration of test procedures for this product.

A. Authority

The Energy Policy and Conservation Act, as amended (“EPCA”),¹ authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part B² of EPCA established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency. These products include TVs, the subject of this document. (42 U.S.C. 6292(a)(12))

The energy conservation program under EPCA consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA specifically include definitions (42 U.S.C. 6291), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), energy conservation standards (42 U.S.C. 6295), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

The Federal testing requirements consist of test procedures that manufacturers of covered products must use as the basis for: (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6295(s)), and (2) making representations about the efficiency of those consumer products (42 U.S.C. 6293(c)). Similarly, DOE must use these test procedures to determine whether the products comply with relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

¹ All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Pub. L. 116-260 (Dec. 27, 2020).

² For editorial reasons, upon codification in the U.S. Code, Part B was redesignated Part A.

Federal energy efficiency requirements for covered products established under EPCA generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6297) DOE may, however, grant waivers of Federal preemption for particular State laws or regulations, in accordance with the procedures and other provisions of EPCA. (42 U.S.C. 6297(d))

Under 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE must follow when prescribing or amending test procedures for covered products. EPCA requires that any test procedures prescribed or amended under this section be reasonably designed to produce test results which measure energy efficiency, energy use or estimated annual operating cost of a covered product during a representative average use cycle or period of use and not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

In addition, EPCA requires that DOE amend its test procedures for all covered products to integrate measures of standby mode and off mode energy consumption. (42 U.S.C. 6295(gg)(2)(A)) Standby mode and off mode energy consumption must be incorporated into the overall energy efficiency, energy consumption, or other energy descriptor for each covered product unless the current test procedures already account for and incorporate standby and off mode energy consumption or such integration is technically infeasible. If an integrated test procedure is technically infeasible, DOE must prescribe a separate standby mode and off mode energy use test procedure for the covered product, if technically feasible. (42 U.S.C. 6295(gg)(2)(A)(ii)) Any such amendment must consider the most current versions of the International Electrotechnical

Commission (“IEC”) Standard 62301³ and IEC Standard 62087⁴ as applicable. (42 U.S.C. 6295(gg)(2)(A))

EPCA also requires that, at least once every 7 years, DOE evaluate test procedures for each type of covered product, including TVs, to determine whether amended test procedures would more accurately or fully comply with the requirements for the test procedures to not be unduly burdensome to conduct and be reasonably designed to produce test results that reflect energy efficiency, energy use, and estimated operating costs during a representative average use cycle or period of use. (42 U.S.C. 6293(b)(1)(A))

If the Secretary determines, on her own behalf or in response to a petition by any interested person, that a test procedure should be prescribed or amended, the Secretary shall promptly publish in the *Federal Register* proposed test procedures and afford interested persons an opportunity to present oral and written data, views, and arguments with respect to such procedures. The comment period on a proposed rule to amend a test procedure shall be at least 60 days and may not exceed 270 days. In prescribing or amending a test procedure, the Secretary shall take into account such information as the Secretary determines relevant to such procedure, including technological developments relating to energy use or energy efficiency of the type (or class) of covered products involved. (42 U.S.C. 6293(b)(2)) If DOE determines that test procedure revisions are not appropriate, DOE must publish its determination not to amend the test procedures. DOE is publishing this notice of proposed rulemaking

³ IEC 62301, *Household electrical appliances—Measurement of standby power* (Edition 2.0, 2011-01).

⁴ IEC 62087, *Methods of measurement for the power consumption of audio, video, and related equipment* (Edition 3.0, 2011-04).

(“NOPR”) in satisfaction of the 7-year review requirement specified in EPCA. (42 U.S.C. 6293(b)(1)(A))

B. Background

DOE most recently amended its TV test procedures in a final rule published on October 25, 2013 (“October 2013 final rule”). 78 FR 63823. The current DOE test procedure includes methods for measuring TV power consumption in active mode (*i.e.*, on mode), standby mode, and off mode; TV screen luminance; and the annual energy consumption (“AEC”) of TVs. As part of the on mode testing, DOE adopted the use of IEC Standard 62087, Edition 3.0, 2011-04 “Methods of measurement for the power consumption of audio, video, and related equipment” (“IEC 62087:2011”). IEC 62087:2011 includes a video test clip on a DVD and Blu-ray Disc™ to be used when conducting on mode testing (“IEC test clip”), as well a static, black-and-white 3-bar image for measuring screen luminance.

Subsequently, on June 24, 2016, DOE published in the *Federal Register* a request for information (“June 2016 RFI”) seeking comments on the existing TV test procedure. 81 FR 41262. In the June 2016 RFI, DOE noted that it found certain TVs consistently demonstrated decreased power use when displaying the IEC test clip as compared to other test clips. *Id.* at 81 FR 41277. DOE noted that this reduction in power consumption was primarily seen in TVs that had motion-based dynamic dimming (“MDD”) functionality⁵ turned on during testing, which would reduce the power consumption when playing the IEC test clip because the IEC test clip is composed of short segments of high motion stitched together. *Id.* In the June 2016 RFI, DOE

⁵ ANSI/CTA-2037-C defines motion-based dynamic dimming as a television feature that adjusts luminance in response to amount of motion in the displayed image. In practice, MDD dims a TV’s backlight when rapid motion or frequent scene changes are displayed on screen.

requested comments, information, and data on this topic, as well as: the use of the IEC test clip or other test clips; whether the current luminance test, which uses a static 3-bar image to measure screen luminance, was representative of an average use cycle or period of use, or alternative luminance tests that should be considered; and the default settings of a TV and changes to the default settings and special functions by consumers.

DOE received comments in response to the June 2016 RFI from the interested parties listed in Table I.1.

Table I.1 Written Comments Received in Response to June 2016 RFI

Organization(s)	Reference in this NOPR	Commenter Type
Appliance Standards Awareness Project and the Northeast Energy Efficiency Partnerships	ASAP and NEEP	Efficiency Organizations
(Pacific Gas and Electric Company, Southern California Gas Company, Southern California Edison, and San Diego Gas and Electric Company; collectively, the California Investor-Owned Utilities	CA IOUs	Utilities
Consumer Technology Association	CTA	Trade Association
LG Electronics USA, Inc. ⁶	LG	Manufacturer
Natural Resources Defense Council	NRDC	Efficiency Organization
Northwest Energy Efficiency Alliance	NEEA	Efficiency Organization
Samsung Electronics	Samsung	Manufacturer

The received comments in response to the June 2016 RFI are addressed throughout this document and a parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.⁷

⁶ LG Electronics USA, Inc. submitted a second comment after the close of the comment period.

⁷ The parenthetical reference provides a reference for information located in the docket of DOE's rulemaking for TVs. (Docket NO. EERE-2016-BT-TP-0023, which is maintained at www.regulations.gov). The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

Following the publication of the RFI, on January 19, 2017, DOE posted a pre-publication advance notice of proposed rulemaking (“January 2017 pre-publication ANOPR”),⁸ which described potential amendments to the TV test procedure that would address the issues discussed in the RFI as well as a number of other issues, including the configuration of special functions during testing, performing system updates prior to testing, and incorporating updated industry test procedures.⁹ (January 2017 pre-publication ANOPR at pp. 6–10) The January 2017 pre-publication ANOPR was intended to assist DOE in determining whether amendments are needed to ensure that the TV test procedure produces results that are representative of an average use cycle or period of use. (*Id.* at p. 5) The January 2017 pre-publication ANOPR was also intended to facilitate discussion, solicit feedback, and provide input to industry consensus standards setting bodies regarding modifications that DOE was considering so that these other organizations can be apprised of DOE’s considerations as they undertook their own revisions. (*Id.* at p. 6)

While specific comments received in response to the June 2016 RFI are discussed in relevant sections of this document, DOE received certain comments regarding the overall test procedure at appendix H. NRDC and ASAP and NEEP recommended that the test method be updated to be more representative of current typical viewing conditions to provide a more accurate estimate of TV energy consumption during actual usage. (NRDC, No. 2 at p. 1; ASAP and NEEP, No. 6 at p. 1) CA IOUs expressed concerns regarding whether the current test procedure is representative of actual consumer TV viewing conditions. (CA IOUs, No. 8 at pp. 1-2)

⁸ The January 2017 pre-publication ANOPR is available at:
www.energy.gov/sites/prod/files/2017/01/f34/tv_tp_anopr_2017-1-19_4.pdf

⁹ The January 2017 pre-publication ANOPR was not subsequently published in the *Federal Register* due to the Regulatory Freeze Pending Review published on January 24, 2017. 82 FR 8346.

CTA recommended that DOE terminate its test procedure rulemaking process while IEC and CTA update their respective TV test procedures. (CTA, No. 7 at pp. 4–5, 7) CTA stated that DOE’s only appropriate role with respect to the TV test procedure is to adopt and incorporate by reference a full-vetted industry-led standard. (*Id.*) CTA asserted that a DOE-specific test procedure would always lag behind technology innovation and would introduce unnecessary burden for TV manufacturers. (*Id.*) CTA stated that the issues discussed in the RFI did not necessitate the completion of a new TV test procedure rulemaking before the IEC standard was updated. (*Id.*) CTA commented that, while a test procedure for TVs should be maintained to keep pace with technology improvements and changes, there were ongoing efforts to update the industry test standards for TV power measurement. (CTA, No. 7 at pp. 2–3) CTA further commented that the IEC standard has been efficiently produced, is being kept up-to-date as technology evolves, and asserted that the industry standard is therefore consistent with DOE regulatory activities and practical considerations. (CTA, No. 7 at p. 4) Samsung similarly commented that all of the issues discussed in the RFI, as well as additional issues not discussed in the RFI, are within the scope of an IEC development process that had already been initiated at the time. (Samsung, No. 5 at pp. 1–2) CTA and Samsung both recommended that DOE participate in the ongoing IEC standards development when considering revisions to appendix H. CTA stated that this approach is required in order to comply with the Office of Management and Budget (“OMB”) Circular A-119. (CTA, No. 7 at pp. 3–5; Samsung, No. 5 at pp. 1–2)

Subsequently, in October 2021, CTA published an update to its TVs power measurement standard, “Determination of Television Set Power Consumption,” American National Standards Institute (“ANSI”)/CTA-2037-C (“ANSI/CTA-2037-C”), which DOE has tentatively determined addresses many of the concerns DOE raised in the

June 2016 RFI as well as many of the comments submitted by NRDC, ASAP and NEEP, CA IOUs, CTA, and Samsung.

DOE has initially determined that ANSI/CTA-2037-C is consistent with the existing metrics and approach incorporated in the TV test procedure at appendix H, while also incorporating provisions that address current industry trends and improve the accuracy and repeatability of the test procedure. ANSI/CTA-2037-C also adopts several changes that were suggested in public comments submitted by interested parties in response to DOE's June 2016 RFI. DOE participated in the CTA standards development process, including providing input and participating in round robin testing to evaluate the CTA standard while under development, and is currently also participating in the IEC standards development process. A test report detailing the results of the round robin testing is available at the ENERGY STAR website ("round robin test report").¹⁰

II. Synopsis of the Notice of Proposed Rulemaking

In this NOPR, DOE proposes to incorporate by reference into 10 CFR 430.3 the updated industry standard, ANSI/CTA-2037-C, and adopt through reference in appendix H certain provisions of the industry standard that would:

- 1) Establish definitions and symbols associated with the updates to the industry standard including those applicable to the new test equipment,

¹⁰ Televisions Test Report, April 12, 2021. Available at: www.energystar.gov/sites/default/files/ENERGY%20STAR%20TVs%20Test%20Report%20-%20April%202021.pdf

TV settings, and video content (e.g., high dynamic range (“HDR”), dynamic luminance, MDD);

- 2) Update the specifications required for the power supply, power meter, and illuminance meter, including additional requirements to reduce the voltage and frequency fluctuations in the power supply specifically for on mode testing and requiring the calibration of the illuminance meter to a light-emitting diode (“LED”) illuminant;
- 3) Specify the use of a camera photometer for the measurement of dynamic luminance during all on mode testing instead of the usage of a luminance meter only capable of instantaneous luminance measurements;
- 4) Update the method for test video storage to a universal serial bus (“USB”) device rather than a Blu-ray Disc played through a media player that does not conduct any video processing;
- 5) Specify the automatic brightness control (“ABC”) light source to be an LED lamp rather than an incandescent lamp. Additionally, specify that the ABC light source be positioned at an angle of 45 degrees (“°”) from the ABC sensor. The illuminance meter is also required to be angled at 45° pointed directly at the ABC light source;
- 6) Specify detailed unit under test (“UUT”) installation and placement requirements, including the setup of test equipment relative to the UUT and options for placing the TV on the wall or floor, rather than a TV stand or table;

- 7) Specify the TV to be updated to the latest firmware version and include configuration requirements for special functions such as MDD and quick start;
- 8) Introduce on mode testing for TVs with HDR-enabled, and 4K resolution testing;
- 9) Require all on mode and standby mode testing to be conducted with the TV connected to a wide area network (“WAN”) and additionally connected to three types of devices, over local area network (“LAN”), capable for waking the TV: a “smart” speaker, mobile device, and device sending multicast discovery packets every 1 second;
- 10) Include new test clips for high dynamic range-10 (“HDR10”) format;
- 11) Require on mode testing in three different preset picture settings: standard dynamic range (“SDR”) default, SDR brightest, and HDR10 default, rather than a single test in the default preset picture setting;
- 12) Update the ambient light requirements for ABC-enabled testing to 140 lux, 50 lux, 17 lux , and 4 lux, each with a ± 5 -percent tolerance;
- 13) Specify a single standby mode test during which the TV is connected to WAN and additionally connected to the three types of network devices connected via LAN. The standby test period depends on the stability of the average power consumption of the TV during the last third of the measurement period.

Additionally, DOE proposes to amend the calculation of the AEC metric to incorporate the average on mode power in the SDR default, SDR brightest, and HDR10 default preset picture settings and remove the off mode power consumption.

DOE's proposed actions are summarized in Table II.1 compared to the current test procedure as well as the reason for the proposed change.

Table II.1 Summary of Changes in Proposed Test Procedure Relative to Current Test Procedure

Current DOE Test Procedure	Proposed Test Procedure	Attribution
Defines terms applicable to the test procedure.	References certain definitions from ANSI/CTA-2037-C.	Update to industry standard.
Requires power supply and power meter to meet specifications incorporated from IEC 62087:2011.	Updates reference to ANSI/CTA-2037-C, with the exception that only the UUT be powered using the AC power supply.	Update to industry standard.
Requires a luminance meter for luminance testing of TVs.	References ANSI/CTA-2037-C, which specifies the use of a camera photometer.	Update to industry standard.
Requires illuminance meter to be accurate for ambient light measurements.	References ANSI/CTA-2037-C, which requires the illuminance meter to be calibrated to an LED illuminant.	Update to industry standard. Improve representativeness of results.
Requires the playback of specified media from a Blue-Ray player via a Blu-ray Disc.	References ANSI/CTA-2037-C, which utilizes a media player and USB storage device to play the specified media.	Update to industry standard. Improve representativeness of results.
Requires the ABC light source to be an incandescent bulb for ABC testing.	References ANSI/CTA-2037-C, which uses an LED light source for ABC testing.	Update to industry standard. Improve representativeness of results.
Requires the light source to be directed at the center of the ABC sensor from 1.5 meters ("m") away aligned directly with the center of the sensor.	References ANSI/CTA-2037-C, which directs the ABC light source at the ABC sensor at an angle of 45°.	Update to industry standard. Improve representativeness of results.
Requires the TV to be placed at least 0.5 m away from any wall surface and setup according to manufacturer's instructions.	References ANSI/CTA-2037-C, which specifies that the TV must be placed on a table, floor, or wall with a black cloth and reflective card be placed underneath the ABC sensor.	Update to industry standard.
Requires the ambient light to be measured by the illuminance meter at the ABC sensor pointing in the direction of the light source.	References ANSI/CTA-2037-C, which requires the illuminance meter to be positioned at the ABC sensor on a stand that allows it to point directly at the 45° light source.	Update to industry standard. Improve representativeness of results.
Requires TVs to be tested in the default state for all special functions, unless a forced menu is displayed requiring the configuration of special functions, in which case the most power consumption option is selected.	References ANSI/CTA-2037-C, which disables MDD, and conditionally enables "quick start." When a forced menu is displayed, the most power consumptive option is selected, with some exceptions.	Update to industry standard.
Does not conduct any testing for HDR preset picture settings.	References ANSI/CTA-2037-C, which conducts testing in SDR default, SDR brightest, and HDR10 default preset picture settings.	Update to industry standard. Improve representativeness of results.

Current DOE Test Procedure	Proposed Test Procedure	Attribution
Does not require TVs to update their system firmware prior to testing.	References ANSI/CTA-2037-C, which requires the UUT use the latest firmware update and conduct a factory reset.	Update to industry standard.
Requires the TV to be connected to a LAN with no other devices other than the TV.	References ANSI/CTA-2037-C, which requires the UUT be connected to a WAN and additionally be connected with a smart speaker, mobile device, and a network traffic generator over LAN. These network conditions are required for all on mode and standby mode testing.	Update to industry standard. Improve representativeness of results.
Requires the stabilization of the TV by directing the light source with at least 300 lx into the ABC sensor.	References ANSI/CTA-2037-C, which requires the TV to be stabilized by playing 5-minutes of the IEC test clip and comparing the average power between two successive runs.	Updates to industry standard.
Specifies the use of the IEC test clip (in the highest resolution (SD or HD) supported by the TV) played via a Blu-ray Disc as specified in IEC 62087:2011.	References ANSI/CTA-2037-C, which retains the IEC test clip (in SD and HD resolution) but specifies that it must be played via a USB flash drive. Additionally, specifies a new 5-minute HDR10 test clip (in HD and UHD resolution).	Updates to industry standard.
Requires the on mode test to be conducted at ambient light levels of 100, 35, 12, and 3 lux if the TV has ABC enabled by default.	References ANSI/CTA-2037-C, which conducts ABC testing for preset picture settings with ABC enabled by default at ambient light levels of 140, 50, 17, and 4 lux.	Update to industry standard
Measures power consumption and luminance separately.	References ANSI/CTA-2037-C, which measures power consumption as well as dynamic luminance of the TV during the same test.	Update to industry standard.
Requires a luminance test to determine the brightest preset picture setting using the luminance meter and the IEC three-bar image.	References ANSI/CTA-2037-C, which determines the SDR brightest preset picture setting by playing the 5-minute IEC test clip in each preset picture setting (with ABC disabled) and determining the brightest based on the dynamic luminance during the 5-minute test period.	Update to industry standard.
Specifies standby-passive mode, standby-active mode, low mode, and off mode tests.	References ANSI/CTA-2037-C, which conducts a single standby mode test during which the UUT is connected to WAN and additionally connected to three network devices on LAN and the average power consumption is measured for a variable duration, depending on the stability of the power consumption, over a period of 60 to 240 minutes. Additionally, eliminates the off mode test.	Update to industry standard. Improve representativeness of results.
Requires the AEC to be calculated using on mode power, standby-active low power, standby-passive power, and off mode power.	Requires the AEC to be calculated using the on mode power as the average power of SDR default, SDR brightest, and HDR10 default preset picture settings, as well as the standby mode power consumption.	Improves representativeness of results.

DOE has tentatively determined that the proposed amendments described in section III of this NOPR would alter the measured efficiency of TVs and would require retesting of TV basic models. The proposed test procedure is substantively the same procedure established by industry, with some modifications. Discussion of DOE's proposed actions are addressed in detail in section III of this NOPR.

III. Discussion

A. Scope of Applicability

This proposed rulemaking applies to TVs, which are products designed to produce dynamic video, contain an internal TV tuner encased within the product housing, and that are capable of receiving dynamic visual content from wired or wireless sources including but not limited to broadcast signals, display-specific data connections, media storage devices, and/or network connections. 10 CFR 430.2. DOE is not proposing to amend the scope of the current TV test procedure.

B. Updates to Industry Standards

Appendix H references IEC 62087:2011 and IEC 62301, Edition 2.0, 2011-04, “Household electrical appliances – Measurement of standby power” (“IEC 62301 Ed. 2.0”) for certain requirements, while the remaining requirements are specified in appendix H itself.

The IEC and CTA are two industry standards development bodies that have published standards for testing the power consumption of TVs (*i.e.*, IEC 62087 and CTA 2037, respectively). Since publication of the October 2013 final rule, both of these standards have been updated more than once to keep pace with evolving TV technologies. The most recent update was the publication of ANSI/CTA-2037-C in October 2021; an update to the IEC 62087 standard is currently underway.

In this NOPR, DOE is proposing to incorporate by reference ANSI/CTA-2037-C into 10 CFR 430.3 to reference the relevant sections of this industry standard in the DOE test procedure at appendix H. Since publication of the October 2013 final rule, TV

technology has evolved significantly. ANSI/CTA-2037-C addresses many of the technologies (*e.g.*, ultra-high definition (“UHD”) or “4K” resolution, HDR, *etc.*) not previously considered in the development of the current DOE test procedure for TVs and also specifies configuration and setup requirements to improve the representativeness with respect to the current DOE test procedure at appendix H.

While standard definition (“SD”) and high definition (“HD”) were the predominant TV display resolutions at the time of the October 2013 final rule, UHD resolution TVs have gained prominence currently, and 8K resolution TVs are emerging. According to Statista, as of March 2021, around 44 percent of U.S. households with TVs have a 4K-capable TV at home, compared to 31 percent in 2019.¹¹ Additionally, HDR content is more prevalent, and a majority of the TVs are “smart” TVs (*i.e.*, they can be connected to a network connection). In 2016, Information Handling Services (“IHS”) Markit estimated that shipments of TVs supporting HDR functionality would increase from 4 million units in 2016 to more than 30 million units in 2020.¹² Hub Entertainment Research estimates that 52 percent of all TVs are reported in 2021 to be smart TVs, up from 45 percent in 2020.¹³

Accordingly, DOE is proposing to adopt by reference the substantive provisions of ANSI/CTA-2037-C, with some modifications in order to provide additional detail and test conditions in order to improve the representativeness of the test results. DOE has initially determined that the measurement of screen luminance and power consumption as

¹¹ *4K Ultra HDTV household penetration in the United States in 2019 and 2021*. October 19, 2021. Available at: www.statista.com/statistics/1247334/4k-ultra-hdtv-us-household-penetration/

¹² *IHS Study: 4K Ultra HD HDR to take Major TV Market Share by 2020*. October 12, 2016. Available at: hdguru.com/ihs-study-4k-ultra-hd-hdr-to-take-major-tv-market-share-by-2020/

¹³ *Report: Smart TVs Account For 50% of TVs Overall; Found in 70% of TV Homes*. April 7, 2021. Available at: www.mediaplaynews.com/report-smart-tvs-account-for-50-percent-of-tvs-overall-found-in-70-percent-tv-homes/

specified in ANSI/CTA 2037-C would provide a measured result that is more representative of the average period of use of TVs.

Since publication of the June 2016 RFI, DOE has conducted testing according to appendix H, performed investigative testing to understand TV power consumption and the functions that impact power draw, and also participated in round robin testing to evaluate the ANSI/CTA-2037-C standard while it was under development. The round robin testing demonstrated that power consumption and luminance measurements are reproducible within 5 percent between test labs. DOE's testing also demonstrated that luminance and power consumption measurement are repeatable to within a coefficient of variation ("COV") of 3 percent. Based on these test results that were presented in the round robin test report, DOE has tentatively determined that ANSI/CTA-2037-C produces measures of energy consumption that are representative of current TV use, and produces results that are repeatable and reproducible.

DOE is also aware that the CTA working group is currently reviewing ANSI/CTA-2037-C to determine if any revisions are necessary. DOE understands that should the working group make any changes to ANSI/CTA-2037-C, CTA would publish a revised standard, potentially numbered as CTA-2037-D. DOE is participating in the working group meetings to review and revise ANSI/CTA-2037-C. While this NOPR proposes to reference the requirements from ANSI/CTA-2037-C, it also discusses the revisions being considered under CTA-2037-D. DOE requests comment on these revisions as well as any additional revisions under consideration in CTA-2037-D that are not discussed in this document. Should CTA-2037-D publish prior to the publication of any DOE TVs test procedure final rule, DOE intends, after considering stakeholder feedback, to incorporate by reference CTA-2037-D provided the updates in this standard

are consistent with the provisions DOE is proposing in the NOPR or the updates are related to topics that DOE has discussed and solicited comments in this NOPR. The subsequent sections of this NOPR discuss each substantive change in ANSI/CTA-2037-C that DOE proposes to incorporate into appendix H as well as the updates being considered in CTA-2037-D.

DOE requests comment on its proposal to adopt the substantive provisions of ANSI/CTA-2037-C in appendix H with certain modifications.

C. Definitions

Appendix H includes definitions for certain terms that are also defined in ANSI/CTA-2037-C; other terms are defined in ANSI/CTA-2037-C but are not currently defined in appendix H. The following paragraphs discuss the comments in response to the June 2016 RFI that pertain to definitions in appendix H, DOE's response to these comments, as well as DOE's proposal to reference certain definitions specified in ANSI/CTA-2037-C.

“Preset picture setting” is defined in section 2.15 of appendix H as “a preprogrammed factory setting obtained from the TV menu with pre-determined picture parameters such as brightness, contrast, color, sharpness, *etc.* Preset picture settings can be selected within the home or retail mode.” NEEA commented that the term “preset picture setting” could be confusing, since it could potentially refer to both preset picture settings and picture parameters (*e.g.*, brightness, backlight, contrast, *etc.*). NEEA commented that manufacturers typically refer to preset picture settings as picture modes in their onscreen menus and recommended adopting that same terminology to improve clarity in the test procedure. (NEEA, No. 3 at p. 11) ANSI/CTA-2037-C includes a

definition for “preset picture setting” rather than picture modes. DOE proposes to reference this definition, which defines the term as a picture setting that is selectable by a user from a set of manufacturer-defined picture settings. DOE has initially determined that the term as provided in the CTA standard reflects industry use and understanding of the term and proposes to adopt the term in the DOE test procedure through reference to ANSI/CTA-2037-C.

The term “prompt” is used in section 5.5 of appendix H as follows: If at any time during on mode operation a message prompt is displayed requesting the configuration of special functions, the most power consumptive configuration shall be selected. LG commented that DOE should clarify the term “prompt” in the test procedure, since it may be interpreted that the opportunity to change a setting is the same as “prompting” the consumer to change a setting. LG suggested the following definition: “Prompt means action or suggestion that encourages users to make a particular selection.” (LG, No. 4 at p. 5) In the ANSI/CTA-2037-C standard, which DOE proposes to reference to test TV power consumption, the word “prompted” is used in the definition of the term “forced menu¹⁴” and in Section 9.2 (Initial Steps) in the instruction to “Proceed through initial set-up prompts” after powering on the UUT. DOE has tentatively determined that the definition of “forced menu” provides the necessary context for the term “prompt” to be understood as an action that the user must take for initial configuration setup. Therefore, DOE is not proposing to define “prompt.”

The definitions currently specified in appendix H are either provided directly or through adoption of certain definitions provided in IEC 62087:2011. However, many of

¹⁴ In Section 5.1 of ANSI/CTA-2037-C, “forced menu” is defined as: Configuration selections required of the user when a Television Set is turned on for the first time that force the user to make set-up configuration decisions when prompted.

these terms are also defined in ANSI/CTA-2037-C. Table III.1 identifies the terms that are currently used in appendix H and ANSI/CTA-2037-C, the similarities and differences in their respective definitions, and whether DOE proposes to adopt each definition through reference to ANSI/CTA-2037-C.

Table III.1 Terms Currently Used in Appendix H and ANSI/CTA-2037-C and the Similarities or Differences Between Definitions

Terms Currently in Appendix H	Terms Currently in ANSI/CTA-2037-C	Similarities/Differences between Definitions	Adopt by Reference to ANSI/CTA-2037-C for Appendix H?
Brightest selectable preset picture setting	Brightest selectable preset picture setting	Appendix H refers to the brightest picture setting within either the home or retail configuration, whereas ANSI/CTA-2037-C refers only to the brightest preset picture setting within the home configuration. ANSI/CTA-2037-C additionally specifies that this is a user-selectable preset picture setting.	Yes
Default picture setting	Default picture setting	ANSI/CTA-2037-C specifies that this picture setting is determined using only the home configuration. appendix H indicates the default picture setting may be decided after a forced menu, which ANSI/CTA-2037-C does not mention.	Yes
Forced menu	Forced menu	Substantively the same definitions	Yes
Home configuration	Home configuration	Substantively the same definitions	Yes
Illuminance	Illuminance	Substantively the same definitions	Yes
Luminance	Luminance	Substantively the same definitions	Yes
Main battery	Main battery	Substantively the same definitions	Yes
Off mode	Off mode	ANSI/CTA-2037-C provides a note that describes how some power may still be consumed when the UUT is in off mode. Appendix H does not include such a note.	Yes
On mode	On mode	Similar definitions	Yes
Preset picture setting	Preset picture setting	Appendix H provides details on the specific parameters that may be determined by the preset picture setting.	Yes
Standby-passive mode	Standby-passive mode	Similar definitions	Yes
Additional functions		Not listed in the definitions section of ANSI/CTA-2037-C	No
Auxiliary Battery		Not listed in the definitions section of ANSI/CTA-2037-C	No
Retail configuration		Not listed in the definitions section of ANSI/CTA-2037-C, however Section 9.2 of ANSI/CTA-2037-C specifies that, “the UUT shall be configured in home configuration.” No mention of retail configuration exists in ANSI/CTA-2037-C	No
Special functions		Not listed in the definitions section of ANSI/CTA-2037-C. The term special functions is not used anywhere in ANSI/CTA-2037-C	No
Standby-active, high mode		Standby-active, high and Standby-active, low modes have been combined into a single Standby-active mode definition in ANSI/CTA-2037-C. In ANSI/CTA-2037-C, standby-active mode differs from Standby-passive mode	No

		by allowing the UUT to be switched into another power mode using an external signal in standby-active mode.	
Standby-active, low mode		See above.	No
(not defined)	Automatic brightness control	This term is used frequently in ANSI/CTA-2037-C.	Yes
(not defined)	Dynamic Luminance	This term defines the TV screen's luminance as measured during the playback of dynamic video content.	Yes
(not defined)	Energy-Efficient-Ethernet	This term is used in the Network connection hierarchy in both ANSI/CTA-2037-C and appendix H. H.	Yes
(not defined)	Filmmaker Mode	This term is defined in ANSI/CTA-2037-C but is not referenced elsewhere within the test method.	No
(not defined)	HDR10	This term defines a specific video display format that is used to test the UUTs power consumption.	Yes
(not defined)	High-definition multimedia interface ("HDMI®")	This term defines a video input terminal for TVs. It is defined at 10 CFR 430.2; therefore, it does not need to be defined in appendix H.	No
(not defined)	High Dynamic Range ("HDR")	This term more broadly defines the video format category that HDR10 belongs to.	Yes
(not defined)	Hybrid Log Gamma ("HLG")	This term defines a type of HDR video and is used when describing the test signals used during testing.	Yes
(not defined)	International System of Units	This is defined as "The modern form of the metric system". This term does not need to be defined in appendix H since it is a generally understood term.	No
(not defined)	Motion-Based Dynamic Dimming ("MDD")	This term defines a television feature that adjusts luminance in response to motion being displayed and is disabled during TV testing.	Yes
(not defined)	Neutral density ("ND") filter	This term is used to define the filter that is used to accomplish the 3 lux luminance requirement for on mode testing.	Yes
(not defined)	Partial on mode	This term defines the standby sub-modes.	Yes
(not defined)	Perceptual Quantization Video	This term defines a specific video utilized by HDR. It is not referenced elsewhere in ANSI/CTA-2037-C.	No
(not defined)	Power Modes	This term identifies all the various power modes: off mode, on mode, partial on mode, which includes standby-passive and standby-active). The generic term power mode is not referenced elsewhere in ANSI/CTA-2037-C.	No
(not defined)	Quick start	This term defines quick start functionality, which is a special function that impacts the time it takes for a TV to transition to on mode from partial on mode.	Yes
(not defined)	Snoot	This term defines an object used to prevent the ABC lamp light from reflecting off the UUT and interfering with the dynamic luminance data collection. It is not a required tool but may be needed for testing in specific instances.	Yes
(not defined)	Stand	This term defines the device used to hold the UUT upright. This term is not included in the TV test procedure since it is a generally understood term.	No
(not defined)	Standby-Active Mode	This term defines a power mode where the UUT does not provide picture or sound but can be switched into	Yes

		another power mode with the remote control, an internal signal, or an external signal. The external signal is what differentiates standby-active mode from standby-passive mode.	
(not defined)	Standby-Passive Mode	This term defines a power mode where the UUT does not provide picture or sound but can be switched into another power mode with the remote control or an internal signal but not an external signal.	Yes
(not defined)	Television set	This term is defined at 10 CFR 430.2; therefore, it does not need to be defined in appendix H.	No
(not defined)	Wake-By-Remote-Control-App	This term defines the ability to wake a UUT using a network-connected device and is used during standby mode testing.	Yes
(not defined)	Wake-By-Smart-Speaker	This term defines the ability to wake a UUT using a voice command via smart speaker and is used during standby mode testing.	Yes
(not defined)	Wake-On-Cast	This term defines the ability to wake a UUT by streaming a video from a mobile device to the UUT and is used during standby mode testing.	Yes

While some of the defined terms in ANSI/CTA-2037-C have minor differences compared to the current definitions in appendix H, DOE has initially determined that these differences are not substantive and would not change the meaning of the defined terms or impact testing according to the proposed test procedure compared to the current test procedure. Accordingly, to harmonize with the current industry standard, DOE proposes to reference Section 5.1 of ANSI/CTA-2037-C for the definitions of the terms used in the TV test procedure. DOE also proposes to reference Section 5.2 of ANSI/CTA-2037-C to include the relevant abbreviations that are used in the TV test procedure. Further, for the terms that are currently defined in appendix H but a definition does not exist in ANSI/CTA-2037-C (*e.g.*, additional functions, auxiliary battery, retail configuration, special functions, standby-active, high mode, and standby-active, low mode) DOE proposes to remove these terms from appendix H because they are not referenced in ANSI/CTA-2037-C nor used anywhere in the proposed test procedure.

Finally, DOE notes that the CTA working group is considering revising definitions for power modes (*i.e.*, on mode, partial on mode, *etc.*). In particular, the

working group is considering deleting the definitions for off, standby-active, and standby-passive modes and updating the definition of partial on mode to specify that it is a mode in which the TV is connected to an external power source, does not provide picture or sound, and can be switched into another mode with a remote control. The definition under consideration for partial on mode in CTA-2037-D aligns, in part, with the current definitions specified in ANSI/CTA-2037-C for standby-passive and standby-active modes, which are sub-modes of partial on mode. In general, the CTA working group intends to update all references to standby mode as partial on mode. The working group also does not intend to differentiate between standby-active and standby-passive modes in CTA-2037-D, but the standard would require that the partial on mode power consumption be captured under one of three parameters depending on the type of functionality that is supported during the partial on mode test (as discussed further in section III.G.3 of this document). DOE notes that although the CTA working group is considering using the term ‘partial on mode’ throughout CTA-2037-D, DOE would refer to this mode as ‘standby mode’, if CTA-2037-D were to be finalized with ‘partial on mode’ as the defined term. DOE may consider additional definitions for sub-modes within standby mode, if necessary. These would include definitions for terms such as standby-passive and standby-active, which DOE is proposing to reference from ANSI/CTA-2037-C in this document.

DOE requests comment on defining the identified terms in appendix H through reference to ANSI/CTA-2037-C.

DOE also requests comment on whether it should consider the revisions to the power mode definitions that are under consideration by the CTA working group for CTA-2037-D.

D. Test Equipment

1. Power Supply

Sections 3.1 and 3.2 of appendix H reference Section 4.3.1 of IEC 62301 Ed. 2.0 for the voltage and frequency and power supply requirements for testing TVs. The requirements specify that the voltage and frequency for each region within North America must have a voltage of 115 volts (“V”) and frequency of 60 hertz (“Hz”). IEC 62301 Ed. 2.0 additionally includes requirements for other regions around the world.

Section 7.1.1 of ANSI/CTA-2037-C only specifies the North American-specific requirements; however, these requirements are specified under the standby mode power supply requirements rather than on mode. The CTA working group is considering moving these requirements under the power supply requirements for on mode in CTA-2037-D. DOE expects that the same power supply is used to test on mode and standby mode power consumption and the specific location of where the requirement is specified would not alter the power supply that is used to test a TV.

Additionally, given that DOE’s test procedure is applicable to only those TVs that are a type which, to any significant extent, are distributed in commerce in the United States for personal use or consumption by individuals (42 U.S.C. 6291(1); 42 U.S.C. 6292(a)(12); 42 U.S.C.), the North American-specific requirements specified in ANSI/CTA-2037-C are sufficient for the DOE test procedure. Therefore, DOE proposes to reference Section 7.1.1 of ANSI/CTA-2037-C for the alternating current (“AC”) power supply specification.

Section 3.2 of appendix H additionally specifies that the total harmonic distortion of the supply voltage must not exceed 5 percent, inclusive to the 13th order harmonic,

when the unit is under test. Section 7.1.1 of ANSI/CTA-2037-C specifies that the total harmonic distortion must not exceed 2 percent up to and including the 13th harmonic.

DOE proposes to reference the power supply requirements from ANSI/CTA-2037-C. While the total harmonic distortion specification is more stringent in ANSI/CTA-2037-C, based on its internal testing and general agreement from manufacturers during the ANSI/CTA-2037-C development working group meetings, DOE has initially determined that most power supplies are capable of meeting this requirement; thus, DOE expects that most, if not all, power supplies currently used for TV testing are able to meet the requirements specified in ANSI/CTA-2037-C. Therefore, DOE does not expect the proposed reference to the power supply requirements would result in additional burden.

The introductory text in Section 9 of ANSI/CTA-2037-C states that power shall be provided to the ABC lamp, camera photometer, and UUT from the specified AC power source. DOE has initially determined that using the same AC power source to power the UUT as well as the ABC lamp and camera photometer could unintentionally impact the power consumption measurement of the UUT due to “noise” from the ABC light source and fluctuations in power draw caused by the camera photometer and ABC light source. Additionally, the CTA working group is considering revising this requirement for CTA-2037-D to specify that only the UUT be powered using the power source specified in Section 7.1.1 of the CTA-2037 standard, the camera photometer and lamp must not be powered by the same controlled power source, and that the camera photometer and lamp may be powered by mains power. Accordingly, DOE proposes to specify that TVs must be tested with only the UUT powered by the specified AC power

source. The camera photometer and ABC lamp may be powered using standard mains electricity.

DOE requests comment on referencing Section 7.1.1 of ANSI/CTA-2037-C for the power supply requirements. DOE also requests comment on referencing the updated requirements that are under consideration for CTA-2037-D, which would move the voltage and frequency requirements for the power supply from the standby mode to on mode section within Section 7.1.1 of the CTA-2037 standard.

DOE requests comment on its proposal to connect only the UUT to the specified AC power source during testing and to specify that the camera photometer and ABC lamp may be powered via mains power. DOE also requests feedback on whether the camera photometer and ABC lamp should be connected to additional specified AC power sources and the burden versus benefit of such an approach.

2. Power Meter

The power meter requirements specified in section 3.3 of appendix H are the same as the requirements specified in Section 7.1.2 of ANSI/CTA-2037-C, which includes the specification of a wattmeter as well as the allowable uncertainty in measurement. ANSI/CTA-2037-C additionally specifies calibration requirements for the power meter, the current crest factor, and the lower bound on the current range. Accordingly, DOE proposes to reference Section 7.1.2 of ANSI/CTA-2037-C for the power meter requirements because it includes the requirements currently specified in appendix H, and the additional requirements specified would ensure that the power meter remains within bounds and calibrated to ensure the results obtained are valid and representative. Based on feedback from manufacturers and test labs during the ANSI/CTA-2037-C working

group meetings, DOE understands that the additional requirements would not add substantive burden in sourcing a power meter.

DOE requests comment on its proposal to reference the power meter requirements from ANSI/CTA-2037-C. Specifically, DOE requests feedback on the potential burden, if any, to meet the more stringent requirements specified in ANSI/CTA-2037-C.

3. Luminance Meter

Section 3.4 of appendix H specifies the accuracy requirements for a luminance meter, which is used to measure screen luminance in the default and brightest preset picture settings as well as the default retail picture setting. The current luminance measurement is performed using the static, 3-bar black-and-white image from IEC 62087:2011. This static black-and-white image does not result in representative luminance measurements because TVs are rarely used to display static images (*i.e.*, the content played on TVs is almost always dynamic, or in motion) and pure white color is rarely displayed on a TV screen (*i.e.*, most scenes displayed on a TV screen are a mix of various colors); therefore, measuring luminance using the black-and-white image is not representative of typical consumer use. DOE is therefore proposing to measure dynamic screen luminance (*i.e.*, luminance of the screen when playing dynamic video content such as the IEC test clip) as specified in ANSI/CTA-2037-C to ensure that a TV's screen luminance is measured at the same time as its power consumption, which would provide consumers a direct relationship for TV brightness (*i.e.*, luminance) as a function of its power consumption. DOE has initially determined that a dynamic screen luminance measurement would provide results that are more representative of real-world in comparison to the currently specified static black-and-white image.

In general, a luminance meter cannot measure dynamic screen luminance; instead, ANSI/CTA-2037-C specifies use of a camera photometer to measure the dynamic luminance of the TV screen during each on mode test. The camera photometer captures the light from the TV screen while displaying video content, and the average of the light entering the camera photometer's sensor in each frame is translated into the average luminance of the TV screen. In conjunction with the proposal to measure dynamic screen luminance, DOE proposes to remove the existing luminance meter requirements specified in section 3.4 of appendix H and instead reference Section 7.1.4 of ANSI/CTA-2037-C, which specifies the requirements for the camera photometer's uncertainty, resolution, sample area, and data rate.

Additionally, the CTA working group is considering specifying an additional requirement in CTA-2037-D that the camera used for testing should be calibrated against a traceable light source that more closely matches the spectral power density of LED/OLED TVs than does standard illuminant A (*e.g.*, D65, LED-RGB1).

DOE requests comment on its proposal to measure dynamic screen luminance and to specify use of a camera photometer to measure dynamic screen luminance. In particular, DOE requests comment on any concerns with the burden associated with using a camera photometer as specified by ANSI/CTA-2037-C to measure screen luminance.

DOE also requests comment on the additional calibration requirement under consideration for CTA-2037-D and whether DOE should include this requirement for its TVs test procedure.

4. Illuminance Meter

Section 3.5 of appendix H specifies accuracy requirements for the illuminance meter, which is used to measure the room illuminance levels at the ABC sensor for tests that are conducted with ABC on. Section 7.1.3 of ANSI/CTA-2037-C specifies the same accuracy requirements for an illuminance meter and additionally specifies calibration requirements for the illuminance meter. Additionally, ANSI/CTA-2037-C specifies certain requirements if the illuminance meter is neither a spectroradiometer nor calibrated against an illuminant replicating the spectral emissions of LEDs. However, the CTA working group is re-evaluating these requirements.

The CTA working group is considering reducing some of the requirements to ease test burden by clarifying that only specific requirements of the calibration standard must be met. These requirements are for the illuminance meter accuracy and relative spectral response. An additional requirement is also being considered which would require the center of the cosine receptor to be $\leq 40\text{mm}$ in depth.

DOE has initially determined that the illuminance meter requirements specified in Section 7.1.3 of ANSI/CTA-2037-C are appropriate because DOE is proposing that an LED lamp be used for ABC testing rather than an incandescent lamp as specified currently in appendix H (see section III.D.6 of this document for more detail). However, DOE will continue evaluating the updated language that is under consideration by the CTA working group. At this time DOE proposes to reference Section 7.1.3 of ANSI/CTA-2037-C for the illuminance meter requirements.

DOE requests comment on its proposal to reference the illuminance meter requirements, including the calibration requirements, from ANSI/CTA-2037-C.

DOE also requests comment on the updated illuminance meter requirements under consideration for CTA-2037-D, whether DOE should consider referencing the updated requirements when finalized, and the reason(s) for doing so.

5. Video Input Device

Section 3.6 of appendix H contains video input device requirements that specify the use of a Blu-ray player and requires that the video input device manufacturer be different from the manufacturer of the UUT. ANSI/CTA-2037-C specifies the use of a USB flash drive¹⁵ to play the IEC test clips. Specifically, Sections 7.1.5 through 7.1.7 of ANSI/CTA-2037-C specify the use of a USB 3.0 flash drive that stores the test clips for playback and a separate media player that contains a USB port to send media to the UUT via an HDMI cable. ANSI/CTA-2037-C specifies that the media player must have a video setting that does not perform any video processing (*e.g.*, noise reduction, upscaling, or adjustment of color, hue, contrast, or brightness). ANSI/CTA-2037-C does not include the requirement that the manufacturers for the media player and UUT must be different.

ANSI/CTA-2037-C additionally requires that all media must be stored and played from a FAT32 or ExFAT¹⁶-formatted USB flash drive via the USB port in the media player. ANSI/CTA-2037-C requires that the test clips stored on the USB flash drive are played via a USB port on a media player instead of the designated USB port on a UUT. During ANSI/CTA-2037-C working group meetings, stakeholders noted that some TVs may alter the default picture setting if the media is played using the USB port on the TV rather than a media player connected via HDMI. By storing the media on a USB flash

¹⁵ ANSI/CTA-2037-C refers to a USB flash drive as a “USB thumb drive” and a “USB stick.”

¹⁶ FAT32 and ExFAT refer to file allocation formatting systems for storage devices such as USB flash drives. FAT32 means 32-bit version of FAT file allocation table system. exFAT means extensible file allocation table.

drive and playing through a media player, any video processing from the UUT would be avoided.

DOE proposes to reference the video media player requirements from ANSI/CTA-2037-C. DOE has conducted testing using both the Blu-ray Disc played via a Blu-ray player and the USB flash drive played via a Blu-ray player. DOE has not found any difference in playing the content via a USB flash drive connected to the Blu-ray player versus a Blu-ray Disc played via the Blu-ray player with video processing turned off on the Blu-ray player. DOE proposes to align with the ANSI/CTA-2037-C requirements.

As described, section 3.6 of appendix H specifies that the Blu-ray player manufacturer shall be different from the manufacturer of the UUT to prevent device interaction. ANSI/CTA-2037-C does not include this requirement. DOE requests comment on whether it should maintain the current requirement that the UUT and media player are from different manufacturers.

DOE requests comment on its proposal to reference the media player and USB flash drive requirements from ANSI/CTA-2037-C. DOE also requests comment on whether DOE should maintain the current requirement that the media player and UUT must not be from the same manufacturer.

6. Light Source for ABC Testing

For conducting tests for TVs with ABC enabled by default, appendix H requires the use of a lamp to alter the amount of light that is directed to the ABC sensor of the TV. Section 7.1.3.3 of appendix H specifies that the ABC lamp must be a standard spectrum, halogen incandescent aluminized reflector lamp and also includes specifications for the

lamp diameter, beam angle, and center beam candlepower. Such a light source is used in conjunction with a variable transformer to control the brightness of the lamp, which in turn controls the illuminance at the ABC sensor. This setup measures TV power consumption at different room ambient conditions, reflective of use wherein sometimes TVs are used in a bright room (*e.g.*, during the day) while other times they would be used in a dark room (*e.g.*, at night or with room lights turned off).

Section 7.1.9 of ANSI/CTA-2037-C specifies the ABC light source requirements, namely that an LED reflector lamp with dimmer switch must be used to provide the specified room illuminance levels. The industry test standard specifies an LED rather than incandescent lamp in response to the growing market for in-home LED lighting. Section 7.1.9 of ANSI/CTA-2037-C additionally specifies the diameter, rated beam angle, correlated color temperature, and color rendering index of the lamp. Further, it specifies a 1-percent allowable tolerance in illuminance measurement and the use of a neutral density (“ND”) filter to reach illuminance levels less than 10 lux, which are consistent with the current requirements in appendix H. DOE has conducted testing using such an LED lamp and did not find any substantive differences in the test conduct compared to using an incandescent lamp. DOE proposes to reference Section 7.1.9 of ANSI/CTA-2037-C for the ABC light source requirements.

DOE requests comment on its proposal to reference Section 7.1.9 of ANSI/CTA-2037-C for the light source required for conducting tests with ABC enabled.

E. Test Room Setup

1. Room Ambient Conditions

Sections 4.1 and 4.2 of appendix H specify the ambient temperature and relative humidity conditions of the test room, respectively. The temperature conditions reference Section 11.4.1 of IEC 62087:2011, which specifies a requirement of 23 degrees Celsius ($^{\circ}\text{C}$) $\pm 5^{\circ}\text{C}$. Section 4.2 of appendix H specifies that the ambient relative humidity must be maintained between 10 percent and 80 percent. Section 7.3 of ANSI/CTA-2037-C specifies the same ambient test room and relative humidity requirements. DOE proposes to reference these requirements from ANSI/CTA-2037-C.

DOE requests comment on whether the specified ambient temperature and humidity requirements are adequate or whether the temperature and relative humidity specifications should include additional specification regarding the precision and/or accuracy of the instruments used to verify that the required ambient conditions are maintained.

2. Room Illuminance Level

Section 4.3 of appendix H specifies that all luminance and on mode testing must be performed in a room with an illuminance level less than or equal to 1.0 lux measured at the UUT's ABC sensor while the TV is in off mode or standby mode. Section 7.4 of ANSI/CTA-2037-C specifies the same requirement but includes an additional requirement regarding the positioning of the illuminance meter used for this measurement (*i.e.*, the illuminance meter must be positioned at the ABC sensor in the same manner as it would be positioned during luminance and power measurement tests). As this requirement is generally the same between appendix H and ANSI/CTA-2037-C, but with additional specificity regarding meter placement, which would further ensure

repeatability and reproducibility of the test results, DOE proposes to reference Section 7.4 of ANSI/CTA-2037-C for the room illuminance level.

DOE requests comment on its proposal to reference Section 7.4 of ANSI/CTA-2037-C for the room illuminance level and requirement to position the illuminance meter in the same manner as it would be positioned during luminance and power measurement tests.

3. UUT Installation and Placement

Section 4.4 of appendix H specifies that the UUT must be installed in accordance with manufacturer's instructions. Additionally, section 4.5 of appendix H includes requirements for TV placement, which specifies that TVs tested with ABC enabled must be placed at least 0.5 meters away from any wall surface and that all four corners of the face of the TV must be placed equidistant from a vertical reference plane.

DOE notes that many manufacturers provide instructions for multiple installation configurations for the TV, such as stand mounted and wall mounted, and do not specify a single method as a recommended or preferred approach.

Section 8 of ANSI/CTA-2037-C specifies the installation and setup requirements for the UUT as well as all other test equipment relative to the placement of the TV. Specifically, ANSI/CTA-2037-C Sections 8.2, 8.2.2, and 8.2.3 provide instructions on installing a UUT for testing, including a preference for installing a TV using a stand mount if possible; if not, using a wall mount; and if the UUT is neither stand-mounted nor wall-mounted (*e.g.* permanently mounted in a wheeled furniture stand), special case installation instructions are specified in which the UUT assembly (including whatever support mechanisms or furniture that are part of the UUT) are positioned on a floor.

Section 8.2.4 specifies requirements for positioning the ABC sensor relative to the UUT for cases where the UUT has an ABC sensor that is not permanently mounted on the display (*e.g.*, in an external enclosure or sound bar).

Additionally, ANSI/CTA-2037-C describes the requirements for the placement of the LED lamp, camera photometer, and illuminance meter relative to the UUT.

Currently, when testing according to appendix H, the incandescent lamp used for ABC testing is pointed directly at the ABC sensor and placed 1.5 meters from the center of the ABC sensor, as specified in section 7.1.3.4 of appendix H. ANSI/CTA-2037-C specifies placing the LED lamp at a 45° angle pointed at the ABC sensor and also specifies requirements to ensure that light is not reflected off the TV screen. DOE tentatively finds that positioning the lamp at an angle rather than directly in front of the sensor would be more representative of real world conditions, as lighting is generally not placed such that a lamp shines directly towards the ABC sensor; instead, any light reaching the sensor is generally directed at the TV screen at an angle, either from overhead lighting or floor lamps. DOE has conducted testing with the LED lamp placed at a 45° angle and has tentatively determined that this setup is achievable and provides results that are repeatable. Subsequent to when DOE performed its investigative testing, the ANSI/CTA-2037-C test procedure was further revised to include more detailed setup instructions, including specifying a lamp angle tolerance of 2° and providing additional instructions in order to position the lamp angle precisely. DOE is proposing to adapt the requirements specified in ANSI/CTA-2037-C regarding lamp setup.

Further, Section 8.1.2 of ANSI/CTA-2037-C details the orientation and placement of the illuminance meter. Section 7.1.3.5 of appendix H provides general instruction for the illuminance meter placement, stating that the meter must be positioned at the ABC

sensor in the direction of the light source. ANSI/CTA-2037-C specifies that the illuminance meter must be oriented at an angle of 45° to be aimed directly at the light source, which is also oriented at 45° relative to, and pointing towards, the ABC sensor. ANSI/CTA-2037-C also requires a firm stationary mount for the illuminance meter to allow for consistent measurement of the illuminance. The requirements in Section 8.1.2 of ANSI/CTA-2037-C are similar to the requirements in section 7.1.3.5 of appendix H, but include additional direction on mounting the illuminance meter and the specific orientation of the light reception dome. DOE proposes to reference these additional requirements for the illuminance meter setup within revised Section 3 (Test Setup) of appendix H.

Section 8.2.5 of ANSI/CTA-2037-C specifies detailed instructions for the placement and setup of the camera photometer, which is used for dynamic luminance measurement. The placement of the camera photometer is dependent on the size of the UUT. The distance between the camera photometer and the TV is proportional to the width of the TV, and the height of the camera photometer is always in the center of the height of the TV. The orientation is 0° with respect to the TV screen, with a 5° tolerance. Section 8.2.5 of ANSI/CTA-2037-C also provides instructions for how to prevent the moiré effect¹⁷ by defocusing the camera photometer appropriately. DOE proposes to reference the ANSI/CTA-2037-C requirements for the placement and setup of the camera photometer. DOE has conducted testing using this setup and has tentatively found this setup provides for a measurement of screen luminance in a repeatable manner.

¹⁷ The moiré effect refers to a visual perception that occurs when viewing the dots of the LEDs in the UUT superimposed on the pixels captured from the camera photometer. The overlapped patterns can cause a glare in the recorded image, which can impact results if not corrected for.

Finally, Sections 7.1.10 and 8.2.1 of ANSI/CTA-2037-C also include additional requirements regarding the table surface on which the UUT is placed for testing. This includes the specifications for covering the table with black, non-reflective cloth and placing a reflective card directly underneath the ABC sensor of the UUT. The reflective card is used to better redirect light from the ABC lamp into the ABC sensor, given the 45° angle of the ABC lamp. DOE proposes to reference these requirements in the test room setup section of appendix H. While DOE proposes to reference these requirements, DOE is aware that the CTA working group is considering amending this requirement to specify that a ‘minimally reflective cloth’ (such as, black felt) rather than a ‘non-reflective cloth’ be used for testing. Accordingly, DOE requests feedback on whether it is appropriate to refer to the cloth as “non-reflective” or if it should use the term “minimally reflective” instead, since no material is truly non-reflective.

DOE requests comment on its proposal to reference all the requirements specified in Section 8 of ANSI/CTA-2037-C for the test room setup. These include the setup of the UUT, illuminance meter, camera photometer, table surface, and reflective card.

DOE also requests comment on whether it is appropriate to specify that the table surface must be covered with black, non-reflective cloth or whether DOE should specify a “minimally reflective” cloth instead.

F. Test Configuration

1. Configuration of Special Functions

Section 5 of appendix H specifies configuration requirements for various TV functions such as: additional functions and special functions; the setup of the TV when presented with forced menu prompts; a connection priority to be used for connecting the

TV to the video input device; the selection of the preset picture setting for on mode tests; video aspect ratio; frame rate; sound level; and network connection configuration. For many of these requirements, appendix H references the requirements specified in relevant sections of IEC 62087:2011. The requirements specified in appendix H are also consistent with earlier versions of the ANSI/CTA-2037 standard.

As TV technology has evolved, the configuration requirements currently specified in appendix H may not be as representative of current TV use. Additionally, as noted in the June 2016 RFI, special functions such as MDD often trigger a more significant decrease in power consumption when testing with the IEC test clip compared to other real-world media content. In the June 2016 RFI, DOE requested comment on how frequently users operate a TV in the default setting, the use of MDD in specific preset picture settings, as well as the setup from forced menu prompts. 81 FR 41278–41279. In response, DOE received the following stakeholder comments.

Samsung commented that MDD is enabled by default and remains “on” in the default picture setting. Samsung stated that MDD is not enabled by default in the other user-selectable preset picture settings, but that the user is informed that these preset picture settings do not have MDD enabled by default. Samsung recommended that instead of disabling energy-saving features such as MDD during testing, such features should remain in their default state, which is generally enabled in the default picture setting. (Samsung, No. 5 at pp. 2–3)

NRDC commented regarding the quick start special function, recommending that if a TV has a quick start option and a normal resume time greater than 10 seconds, DOE

should amend the test procedure such that the TV is tested with quick start turned on, even if the TV is shipped with this function disabled. (NRDC, No. 2 at p. 16)

The CA IOUs commented that some TVs may have features that result in a measured power consumption during DOE testing that is less than the power consumed during real-world operation. The CA IOUs recommended that if MDD features are not intended to be enabled for most viewing, then they should not be enabled in the DOE test procedure. The CA IOUs recommended that DOE address these issues with an updated test procedure to ensure that these features are configured as they would be in the home. The CA IOUs further recommended that if there is ambiguity about how a given setting should be configured, the most power-consumptive option should be chosen. (CA IOUs, No. 8 at pp. 3–5)

NRDC recommended that DOE clarify in the test method how to address software updates, both for an update that might occur when the TV is initially set up and for those updates that happen at a later time. NRDC recommended that if a software update causes a TV's power use to change more than a small amount, then the TV must be retested and recertified. (NRDC, No. 2 at p. 17)

ANSI/CTA-2037-C provides setup requirements for functions including quick start, MDD, and forced menus. Section 9.1 of ANSI/CTA-2037-C specifies that the UUT must operate on the latest manufacturer-supplied firmware and requires a factory reset to ensure the TV is configured with the most recent firmware update.

Section 9.2 of ANSI/CTA-2037-C specifies instructions for the initial configuration of the UUT, including how to adjust according to initial setup and forced menu prompts that may have multiple configurations from which to choose. ANSI/CTA-

2037-C specifies disabling accessibility settings intended for vision or hearing-impaired viewers as well as choosing the configuration that does not include the addition of content such as applications (*i.e.*, “apps”) or TV stations. Other than these exceptions, ANSI/CTA-2037-C specifies that the most power-consumptive configuration must be selected, and the selection must be verified via a test if the most power-consumptive configuration is unknown.

Section 9.7 of ANSI/CTA-2037-C requires all testing to be completed with MDD disabled. Further, Section 9.9 of ANSI/CTA-2037-C provides criteria that are used to determine whether quick start is enabled or disabled during testing. Specifically, quick start is enabled during testing if it is enabled by default or if the wake time of the TV is greater than or equal to 10 seconds when quick start is disabled. In the latter scenario, quick start is enabled to provide the shortest possible resume time. To determine the wake time of the TV for the quick start configuration, ANSI/CTA-2037-C specifies connecting the UUT to LAN without any other devices connected, playing the SDR IEC test clip, turning off the TV for 20 minutes, and turning it back on such that it is configured to turn on to the HDMI input connection that is playing the IEC test clip. The time between turning on the TV to content being displayed is determined to be the wake time of the TV for the configuration of quick start function.

DOE proposes to adopt through reference these sections of ANSI/CTA-2037-C. DOE has tentatively determined that adopting these sections would address stakeholder comments, would make the DOE test procedure consistent with the industry standard for the configuration of these settings, and would ensure that the DOE test procedure is measuring power consumption in a representative and repeatable manner.

While DOE is proposing to reference these requirements, DOE notes that the most power consumptive configuration of a special function may not be readily identified, as required in Section 9.2 of ANSI/CTA-2037-C, particularly because ANSI/CTA-2037-C specifies on mode testing at three preset picture settings. ANSI/CTA-2037-C does not address which configuration should be selected if a given special function impacts power consumption differently when testing the different preset picture settings or power modes. Additionally, the CTA working group is considering updating this requirement to specify that the most energy consumptive configuration of a special function must be selected if a forced menu is displayed requiring the configuration of special functions.

DOE believes it would be more appropriate to require special functions be configured in a manner that is the most *energy* consumptive, as represented by AEC, (rather than *power* consumptive). Configuring special functions in the most energy consumptive state would mean evaluating the AEC of the TV in a given configuration. This approach would be more repeatable and reproducible because the proposed test procedure includes multiple power consumption tests (on mode in the SDR default, SDR brightest, and HDR10 default preset picture settings, and standby mode), which makes it unclear which test's power consumption should be evaluated for the configuration of special functions. Therefore, DOE is considering updating the requirement to specify that for any special functions that must be configured via a forced menu prompt during initial setup, the most energy consumptive state of the special function, as represented by calculation of AEC, must be selected for testing.

Alternately, if DOE were to consider retaining the configuration of special functions using the most power consumptive state of the special function, DOE would

update the requirement to configure special functions in the state that would yield the maximum average power. This is because power consumption is an instantaneous measurement and the point at which power is measured could impact the determination of the most consumptive option.

In addition to considering changing the configuration of special functions from the most power consumptive state to the most energy consumptive state, the CTA working group is also considering changing how the most consumptive state is determined. Currently, ANSI/CTA-2037-C specifies that the selection of the most power consumptive state of a given special function that must be configured via a forced menu prompt must be verified by measuring the power consumption of each possible configuration. For CTA-2037-D, the working group is considering changing this requirement to specify that the option that is more likely to increase energy consumption be selected. That is, rather than verifying the power consumption measurement in each state for each forced menu prompted special function (which could increase test duration and the associated burden exponentially depending on the number of forced menu prompts and the number of options to select for each prompt), the proposal being considered by the CTA working group would require the configuration of special functions from forced menu prompts based on expected behavior of a given special function configuration. The intent of this provision would be to enable any special function that is perceived to provide additional functionality and to disable any special function that is perceived to remove functionality when prompted by a forced menu. As an example, if a UUT has a prompt for enabling or disabling location sharing, this special function is unlikely to use a significant amount of additional energy, but it is more likely that enabling it will result in higher energy consumption than disabling it, and therefore,

location sharing should be enabled during testing, according to the language under consideration by the CTA working group.

The CTA working group is also considering other alternate language to eliminate subjective configuration of special functions from forced menu prompts. In particular, the working group is considering specifying that if it is unknown which configuration yields the most energy consumptive state, then the configuration that enables more functionality should be selected, such as location sharing, data reporting, or data backup. However, if a forced menu is displayed requesting the configuration of features that would reduce or save energy, the configuration that consumes maximum energy should be selected; examples include: smart viewing modes or energy saving functionality. The ultimate goal of such a requirement would be to select the configuration that consumes the most energy, and it is expected that, generally, enabling more functionality would consume more energy. The CTA working group may also consider selecting the option that is highlighted or pre-selected when a given forced menu prompt pops-up on the screen.

In addition to the changes being considered for the configuration of special functions, the CTA working group is considering some other updates to the initial setup requirements. Specifically, the working group is considering specifying that the TV must be tested in the default settings for all functions other than those that require configuration when a forced menu prompt appears on the screen. Further, the working group is considering specifying that the tester must not log into any services if prompted by a forced menu during initial setup, unless it is required for the setup of any other functionality noted in the standard (*e.g.*, smart wake functionality setup via a smart speaker).

The working group also intends to clarify certain requirements for quick start. In particular, to measure the quick start wake time, ANSI/CTA-2037-C specifies that the test must be conducted on LAN, without WAN connection. The working group intends to remove this requirement for CTA-2037-D, so that the quick start wake time check is conducted under the same settings as the rest of the test (*i.e.*, on WAN). Additionally, ANSI/CTA-2037-C specifies that the wake time must be measured when the UUT wakes to the HDMI input. However, it does not state how the wake time should be measured if the UUT does not wake to the HDMI input. For CTA-2037-D, the working group is considering specifying that if the UUT does not wake to displaying video content from the HDMI port, then the wake time measurement period would end as soon as an HDMI input port can be selected to play content. The intent of this requirement is that the wake time is measured up until the point that a user can make a selection on the TV and this time period would determine whether quick start could stay disabled during the test (*i.e.*, if the wake time is less than 10 seconds) or if it should be enabled.

DOE requests comment on whether it should consider requiring that if a forced menu is displayed requesting the configuration of specific features, then the most energy-consumptive configuration, as represented by AEC, must be selected (rather than the most power consumptive configuration). Additionally, if stakeholders support the use of the most power consumptive configuration, DOE requests comment on whether it should specify that the power consumption measurement is averaged over the duration of the test.

DOE additionally requests comment on any approaches that are under consideration for CTA-2037-D by the CTA working group for the initial setup of the TV,

the configuration of forced menu options, or the requirements for the quick start wake time measurement test.

2. Media Player Setup and Connection

Section 9.3 of ANSI/CTA-2037-C specifies requirements for playing video test files using the media player. Specifically, this section specifies that for all UUT setup and test tasks requiring video play, video test files stored on a USB flash drive shall be played from the media player by inserting the USB flash drive into the media player, connecting the media player to the UUT using an HDMI cable, and selecting the HDMI input on the UUT associated with the media player. On the media player, a video setting shall be selected that performs no video processing (*e.g.*, no noise reduction, no upscaling, no adjustment of color, hue, contrast, or brightness).

Sections 5.2 and 5.3 of appendix H require the use of an HDMI input cable and the HDMI input terminal that is designed for viewing live TV or dynamic content from a Blu-ray Disc player or set-top-box. However, appendix H does not provide additional instructions regarding the settings that must be selected for the media player (*e.g.*, noise reduction, upscaling, *etc.*).

Given DOE's proposal to play the media from a USB flash drive rather than a Blu-ray Disc, DOE proposes to incorporate by reference Section 9.3 of ANSI/CTA-2037-C for the media player setup and connection.

3. Test Clips

Appendix H currently specifies use of the IEC 62087:2011 Blu-ray Disc dynamic broadcast-content video signal (*i.e.*, the IEC test clip) for all on mode testing. Section 5.7 of appendix H requires the video aspect ratio of the video signal to fill the entire screen,

and section 5.8 of appendix H requires the frame rate and resolution of the video signal to match the highest available format signal capable of the UUT. In the June 2016 RFI, DOE requested comments on several topics related to the IEC test clip, including the representativeness of the test clip and alternate test clips that DOE could consider for testing TVs. 81 FR 41277.

NRDC recommended that DOE continue to use the current IEC test clip in the near-term, but that DOE develop new content in the long term. (NRDC, No. 2 at p. 8) NRDC recommended that in the long term, the test clip should not have excessive frequency of scene cuts or abnormally short scenes. (NRDC, No. 2 at p. 8) NRDC further recommended that in the long-term, DOE create multiple versions of the test clip for verification purposes in order to reduce the potential for circumvention, and that the clips used during such verification testing could be changed periodically and designed to deliver similar results. (NRDC, No. 2 at p. 17) NRDC also suggested that the test clip be formatted in HD, UHD, and UHD + HDR in the long term. (NRDC, No. 2 at p. 8)

NEEA recommended that the test clip be updated to be more representative of popular content such as news, sports, situation comedies, dramas, commercials, YouTube, internet browsing, and scrolling through still photographs. (NEEA, No. 3 at p. 5) NEEA further commented that modern UHD smart TVs can draw 40-100 watts of power when displaying a fully black image or no image at all. NEEA recommended an updated test clip with a portion that is fully or almost entirely black, in order to determine how a TV's power use scales with its illumination. NEEA commented that this would be representative of scenarios when music is played without accompanying video content, an input signal is not applied, or a dark scene is left paused for extended period of time. NEEA also recommended adding to the updated test clip a scene where small amounts of

white text move against a fully black background, as in the credit sequences at the end of movies. NEEA asserted that this would be a useful test to determine power scaling capability, stating that most non-emissive display TVs would draw a significant amount of power to display properly, while emissive displays would not. (NEEA, No. 3 at p. 5) NEEA also recommended that the test clip be formatted in native resolutions of 4K, HD, and SD, so that the TV displays the content at its native resolution. (NEEA, No. 3 at p. 5) NEEA recommended that HDR content be included in future test clip development. NEEA noted that HDR content increases power use in TVs, and energy-saving features are often disabled or negated when TVs detect HDR content. NEEA asserted that any test clip without HDR encoding will under-represent real-world TV energy consumption as HDR content becomes more common. (NEEA, No. 3 at p. 7–8)

The CA IOUs recommended including testing clips referenced in the June 2016 RFI (*see* 81 FR 41262, 41263-41264 for a description of the test clips) in the updated test procedure, stating they may be more representative of real-world content than the IEC test clip. The CA IOUs also recommended using multiple test clips and requiring that the power measurement for each clip be within a certain range or tolerance, in order to reduce the ability of a TV to recognize a specific test clip. (CA IOUs, No. 8 at p. 5) The CA IOUs also recommended that the test clip be updated to native UHD- and HDR-enabled content. (CA IOUs, No. 8 at p. 5)

LG commented that viewers watch a variety of content, and that different content presents very different images. LG recommended using a test clip composed of a wide variety of genres in order to reflect the variety of content available to consumers. (LG, No. 4 at p. 2)

ASAP and NEEP recommended that the test clip be updated to include 4K + HDR content. (ASAP and NEEP, No. 6 at p. 1)

CTA recommended that the test clip include material consistent with 4K UHD, HDR, and other new TV features. However, CTA also commented that it would take time and resources to include HDR content in a test clip, especially since the technology is fairly new. CTA recommended allowing HDR technology to mature before including it in a test clip. (CTA, No. 7 at p. 6)

As discussed, EPCA requires that any test procedure prescribed or amended must be reasonably designed to produce test results which measure energy efficiency or energy use during a representative average use cycle or period of use and shall not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) Since publication of the June 2016 RFI, stakeholders have collaborated during both IEC and CTA working groups to identify an appropriate test clip for TV testing. As a result of these meetings, the SDR IEC test clip continues to be used for testing the SDR preset picture settings. Additionally, an adapted HDR10 test clip (referred to as the “HDR10 IEC test clip” elsewhere in this document), has been initially developed by the Collaborative Labeling and Appliance Standards Program (“CLASP”),¹⁸ for testing HDR10 preset picture settings. Members of the IEC and CTA working groups have agreed to use this HDR10 test clip for testing HDR10 preset picture settings in the respective industry standards. DOE has participated in these industry consensus standards development efforts and provided input on the test clip development efforts as needed.

¹⁸ Available at: shop.cta.tech/collections/standards/products/determination-of-television-set-power-consumption-ansi-cta-2037-c

ANSI/CTA-2037-C specifies use of the SDR IEC test clip for SDR preset picture settings and the HDR10 IEC test clip for HDR10 preset picture settings, while providing similar direction as appendix H for the aspect ratio, resolution, and frame rate of the video signal. Additionally, as mentioned in previous sections, ANSI/CTA-2037-C specifies that the test clips be played via a USB flash drive rather than a Blu-ray Disc. Currently, the IEC test clips are available for download on CTA's website at: *shop.cta.tech/collections/standards/products/determination-of-television-set-power-consumption-ansi-cta-2037-c*. Should IEC make any changes regarding access and availability of these test clips prior to the publication of the final rule, DOE would update the reference in appendix H accordingly.

DOE proposes to reference Sections 7.2 and 9.5 of ANSI/CTA-2037-C for the test clip provisions. Section 7.2 of ANSI/CTA-2037-C specifies the video files that should be used for determination of on mode power consumption and states that the file with the highest resolution supported by the UUT shall be used. Four test clips are specified in ANSI/CTA-2037-C, two of which are used for SDR preset picture settings and two of which are used for HDR10 preset picture settings. Section 9.5 of ANSI/CTA-2037-C additionally specifies that the aspect ratio of the video content must fill the entire screen without being cropped to ensure all TV pixels are activated during testing.

DOE requests comment on its proposal to reference the SDR and HDR10 IEC test clips specified in ANSI/CTA-2037-C for testing TVs in the default, brightest, and HDR10 preset picture settings.

4. Preset Picture Settings for On Mode Tests

Appendix H requires on mode testing only in the default preset picture setting. In the June 2016 RFI, DOE requested comment on whether it should consider measuring on mode power consumption in picture settings other than the default picture settings, and which picture settings DOE should consider. 81 FR 41279. In response, DOE received the following comments.

Samsung commented that using default settings is appropriate and best represents actual use. Samsung also commented that according to an internal study, approximately 60 percent of consumers stay within the default viewing settings through the lifetime of their TVs. (Samsung, No. 5 at p. 2)

LG recommended against testing picture settings other than the default settings. LG stated that testing in other modes could involve choosing between large numbers of possible combinations, which could be unnecessarily burdensome. (LG, No. 4 at pp. 3–4) LG noted that when viewers change picture settings on an LG TV, other settings will change automatically, since certain settings are incompatible for an optimized experience. LG further commented that many such combinations of settings might not be representative of expected use. (LG, No. 4 at pp. 4–6) LG commented that it is not aware of any academic or detailed studies focusing on changes in default modes for TVs but cited several studies that concluded that consumers typically do not deviate from the default settings. (LG, No. 4 at p. 4) LG further emphasized that some consumers prefer viewing a screen that other consumers would consider too bright or too vivid. LG stated that, while it sets the default picture settings to provide the picture that it believes most viewers want most of the time, viewers can also alter the settings to select the picture they prefer. (LG, No. 10 at pp. 1–2) LG asserted that most people do not change the

default settings. (LG, No. 10 at pp. 3–4) Regarding testing in two modes as suggested by other commenters (discussed in the following paragraphs), LG asserted that such an approach would not be allowed under EPCA because there is no evidence that the most power consumptive state represents an average use cycle. (LG, No. 10 at p. 4)

CTA commented that most consumers do not change the default picture mode and recommended that TVs be tested in their default mode. (CTA, No. 7 at p. 6)

NRDC commented that energy-saving features on some TVs are automatically disabled, without warning to the user, whenever the default picture settings are changed. (NRDC, No. 2 at p. 1) NRDC suggested requiring two tests: the first test would be performed with default settings, provided that the user is not encouraged to disable the energy-savings features via on-screen messages; the second test would be performed with the TV in its most energy-consumptive state, with energy-saving features disabled. NRDC commented that the measured power from each mode could then be aggregated using a weighted metric. (NRDC, No. 2 at pp. 12–13, 17)

NEEA recommended that a TV's reported energy consumption should combine a weighted aggregate of its measured power in default mode with the measured power in the most energy-consumptive mode. NEEA recommended determining the "maximum" power draw by measuring power after identifying the brightest preset picture setting through luminance testing. (NEEA, No. 3 at p. 12) NEEA recommended that power be measured in multiple preset picture modes and averaged in a weighted fashion. (NEEA, No. 3 at p. 11) NEEA further recommended that DOE collect survey data to determine how heavily to weight energy consumption in the default mode versus other modes in which TVs may be operating. (NEEA, No. 3 at p. 11) NEEA also cited research

performed by 3M in 2011, which showed that 47 percent of consumers using HDMI or streamed sources intentionally changed the settings on their TVs to make them brighter. NEEA asserted that the result is that at least half of all TVs in the United States could be in more power consumptive modes than the default picture setting. (NEEA, No. 3 at pp. 10–11)

CA IOUs commented that a market research study conducted in July 2011 by CBS Vision found that 46 percent of the respondents changed the picture settings on their newest TV since it was purchased. CA IOUs recommended that the test procedure require that on mode power be measured in preset picture settings other than the default picture setting. CA IOUs further recommended that the test procedure be amended to allow any preset picture setting to be measured using the test procedure. (CA IOUs, No. 8 at pp. 3–4) CA IOUs recommended that the reporting for TVs with ABC enabled by default be modified so that the on mode power measurements recorded for the ABC test are reported along with the on mode power with ABC disabled. CA IOUs also recommended testing each TV in both its default state and its most energy-consumptive mode. (CA IOUs, No. 8 at pp. 3–5)

ASAP and NEEP recommended that the test procedure be updated to account for any energy-saving features that are automatically disabled whenever the user makes any change to default settings. (ASAP and NEEP, No. 6 at p. 1)

ANSI/CTA-2037-C requires on mode testing using three preset picture settings, based on the functionality of the TV. ANSI/CTA-2037-C requires all TVs to be tested in the default SDR, brightest SDR, and the default HDR10 preset picture settings. These preset picture settings are determined in Sections 9.6 and 9.8 of ANSI/CTA-2037-C.

Specifically, Section 9.6 of ANSI/CTA-2037-C requires the tester to play the SDR IEC test clip to identify the SDR default preset picture setting and the HDR10 IEC test clip to identify the HDR10 default preset picture setting. If ABC is enabled by default in these preset picture settings, the on mode test is conducted with ABC enabled. Section 9.8 of ANSI/CTA-2037-C instructs the tester to identify the brightest preset picture setting using the SDR IEC test clip, which is played for 5 minutes while the camera photometer collects the dynamic luminance of the UUT in each preset picture setting. The preset picture setting with the highest dynamic luminance is determined to be the brightest preset picture setting and is used during on mode testing. Section 9.8 of ANSI/CTA-2037-C also includes details such as how to determine the brightest preset picture setting if the dynamic luminance of the considered settings are very similar and specifies certain preset picture settings that are specifically excluded, such as “PC” or “Game.” Additionally, for CTA-2037-D, the CTA working group is considering explicitly stating that the brightest preset picture setting must be identified with ABC disabled.

DOE has tentatively determined the methodology specified in ANSI/CTA-2037-C addresses many of the concerns expressed in the comments submitted by NRDC, NEEA, the CA IOUs, and ASAP and NEEP; and that this methodology—by capturing a range of preset picture settings that are reflective of different resolutions and brightness settings that consumers may choose among— would produce test results that are more representative of average TV use than the current requirements of appendix H. Therefore, DOE proposes to reference Sections 9.6 and 9.8 of ANSI/CTA-2037-C to identify the preset picture settings that must be selected for testing. DOE additionally proposes to specify that the brightest preset picture setting must be identified with ABC disabled, as is being considered for CTA-2037-D, because the goal of the brightest preset

picture setting selection is to test the UUT when it may be operated at its most power consumptive state; this would be achieved when ABC is disabled.

DOE requests comment on its proposal to reference the requirements in ANSI/CTA-2037-C for the selection of the preset picture settings that must be used for testing and additionally specifying that the brightest preset picture setting be identified with ABC disabled.

DOE is aware of certain preset picture settings being introduced on recent TVs that are known to adapt the TV's configuration based on the content, usage pattern, and the environment in which the TV operates. These TVs use artificial intelligence technology to adapt and adjust these settings and such a preset picture setting is sometimes available in addition to Filmmaker mode (defined in section III.C of this document). While DOE is not proposing any requirement around such a preset picture setting, it requests additional information about such preset picture settings and whether DOE should consider excluding such preset picture settings when selecting the default SDR, brightest SDR, and default HDR10 preset picture settings that are required for testing on mode power consumption.

DOE requests information on preset picture settings that can adapt the TV's configuration based on content, usage pattern, environment, *etc.* DOE also requests comment on whether such preset picture settings should be excluded from testing, even if they are one of the default SDR, brightest SDR, or default HDR10 preset picture settings. If stakeholders support excluding such a preset picture setting from testing, DOE requests comment on which preset picture setting(s) should be used for testing instead,

particularly if the intelligent preset picture setting is a default SDR or default HDR10 preset picture setting.

5. Sound Level

Section 5.9 of appendix H specifies that the TV sound level shall be configured in accordance with Section 11.4.11 of IEC 62087:2011. Section 11.4.11 of IEC 62087:2011 specifies that the volume control shall be adjusted to a level at which the sound output is audible. DOE understands this instruction to mean starting with the volume control at zero and increasing the volume until an audible level is achieved. Section 9.4 of ANSI/CTA-2037-C specifies that the volume control shall be adjusted to a level greater than zero that is closest to 2 percent of the maximum (*e.g.*, a TV with a maximum level of 30 would have its volume set to 1). As this requirement is more objective than the current requirement specified in IEC 62087:2011, while resulting in comparable sound levels, DOE proposes to reference Section 9.4 of ANSI/CTA-2037-C for the sound level requirements in appendix H.

6. Network Configuration

Section 5.10 of appendix H specifies the network connection configuration to which the UUT must be connected. Section 5.10.2 of appendix H requires the UUT to be connected to a LAN both in on mode and prior to being placed in standby mode, if the TV is network enabled. The LAN shall allow devices to ping other devices on the network, but must not allow access to a WAN. Section 5.10.2 also provides a network connection hierarchy table prioritizing that the UUT be connected via Wi-Fi, then Ethernet if Wi-Fi is not supported by the UUT.

In response to the June 2016 RFI, NRDC and ASAP and NEEP recommended that the standby mode test be performed while the TV is connected to a live internet signal (*i.e.*, WAN) during testing and not just to a local network (*i.e.*, LAN), as is currently required. (NRDC, No. 2 at pp. 16–17; ASAP and NEEP, No. 6 at p. 1) The CA IOUs recommended that network connectivity be enabled in standby and on mode testing. (CA IOUs, No. 8 at p. 5)

Sections 7.1.8, 9.10, and 9.11 of ANSI/CTA-2037-C include requirements for network-related equipment and configuration of network connections, and configuration of specified networking devices. Specifically, Section 7.1.8.1 of ANSI/CTA-2037-C specifies that the internet network connection shall support download speeds of at least 25 megabytes per second (“MBps”) and upload speeds of at least 3 Mbps. Sections 7.1.8.2 and 7.1.8.3 specify the use of a smart speaker that shall be used to conduct the wake-by-smart-speaker test and the use of a mobile device that is used for remote control and casting applications. Section 7.1.8.4 specifies that a network traffic generator shall be configured to output multicast discovery packets to the LAN every 1 second. The packets include requests to the UUT typical of everyday use¹⁹ that can be responded to over LAN by the UUT. Section 9.10 requires that for UUTs that are network enabled, both the on mode and standby mode tests be conducted with the UUT connected to an internet-connected (*i.e.*, WAN-connected) LAN network segment that includes no other networking devices besides the devices required to conduct the test (*i.e.*, the smart speaker, mobile device, and network traffic generator). That is, ANSI/CTA-2037-C requires that all on mode and standby mode tests be conducted with the UUT connected to WAN as well as up to three additional devices (*i.e.*, the smart speaker, mobile device, and network traffic generator) connected via the LAN. Section 9.11 of ANSI/CTA-2037-

¹⁹ For example, the packets include commands sent to the Google and Spotify internet servers.

C specifies that for TVs that are advertised to support wake-by-remote-control-app (WbRA), wake-on-cast (WoC), or wake-by-smart-speaker (WbS), enable as many of the supported smart wake features as possible. Any devices used to configure these features (*e.g.*, mobile device, smart speaker, etc.) should be connected to the same LAN as the UUT. Section 9.11 further specifies that the goal is to configure the UUT to wake with as many of the three identified smart wake features as possible. Additionally, the CTA working group is considering explicitly specifying the following additional requirements: (a) the LAN must not include other networking devices besides the devices required to conduct the test; (b) internet connectivity must be confirmed (*e.g.*, by streaming media); (c) if the UUT does not support Wi-Fi or Ethernet connectivity then it shall not be connected to other possible forms of network connection (*e.g.*, MoCA); and, (d) the three smart wake features must be enabled before performing any of the on or standby mode tests.

DOE's analysis of the market indicates that most TVs currently on the market are equipped with the capability to connect to the network. The growing availability of streaming services and video content via digital media suggests that a growing percentage of TVs are connected to an active internet connection when installed in a consumer's home. Additionally, the growth in the market for connected devices, particularly mobile devices and smart speakers, suggests that these devices are also becoming more prevalent in consumer homes. Accordingly, DOE tentatively concludes that the network configuration requirements specified in ANSI/CTA-2037-C—which require an active internet connection for the TV and the configuration of three different types of devices connected to the same local network—are more representative of TVs currently sold on the market than the requirements currently specified in appendix H. Therefore, DOE proposes to reference the network connection requirements specified in Sections 7.1.8, 9.10, and 9.11 of ANSI/CTA-2037-C.

DOE requests comment on its proposal to reference Sections 7.1.8, 9.10, and 9.11 of ANSI/CTA-2037-C for the network configuration requirements.

DOE also requests comment on the updates being considered by the CTA working group for CTA-2037-D as it pertains to the WAN and LAN connection requirements and the connection requirements for smart wake features.

DOE has found through its testing that configuring the specified network devices, especially the smart speaker, to communicate with the TV was challenging for some TV models. While some TV models provide clear instructions in the user manual for smart speaker setup that allowed for relatively quick and easy configuration, other models did not provide adequate instructions within the user manual, TV menus, or the manufacturer website that would allow the tester to configure the TV to connect to the smart speaker correctly. For two models in particular, DOE had to seek additional sources for instructions—such as technology discussion forums on the internet and third-party websites—that provided more detailed instructions to configure the smart speaker. These third-party instructions typically identified one or more additional steps that were missing in the manufacturer instructions, and that when followed would allow the smart speaker and TV to communicate with each other.²⁰

Another challenge that DOE experienced in connecting a smart speaker to the TV was that some TVs were only able to connect to certain smart speaker brands, but not others. For one TV model in particular, DOE was only able to connect the TV to one

²⁰ For example, on one unit, the third-party information identified the need to access a specific setting several layers “deep” within the TV settings menu in order to activate the smart speaker functionality. This information was not specified in the manufacturer-provided instructions.

particular smart speaker brand, despite the TV's user manual explicitly stating that the TV could be connected with multiple different smart brands.

DOE requests feedback on its observed challenges with pairing certain TV models with smart speakers, and whether other laboratories have experienced similar challenges configuring smart speakers or any of the other specified networking devices to connect with a TV model.

DOE also requests comment on whether DOE should consider providing any additional specifications beyond those provided in ANSI/CTA-2037-C, or those being considered for CTA-2037-D, to facilitate establishing the required network connections with additional devices.

G. Test Conduct

Section 7 of appendix H specifies the tests for measuring on mode power consumption, luminance, standby mode power consumption, and off mode power consumption. The following sections describe proposed changes to each of these tests.

1. On Mode Test

As discussed in previous sections, DOE is proposing to adopt the testing requirements specified in ANSI/CTA-2037-C, which specifies a new method to measure dynamic screen luminance at the same time as on mode power consumption. Accordingly, the on mode test specified in ANSI/CTA-2037-C, which DOE proposes to adopt, specifies requirements for camera configuration, UUT stabilization, and measurement of luminance and power consumption.

Section 10 of ANSI/CTA-2037-C specifies the camera configuration and UUT stabilization procedure. First, the camera photometer must be configured to ensure that the UUT's screen border fits in the camera's field of view. Additionally, the color correction factors must be identified, if necessary, per the camera manufacturer's instructions. The UUT is then stabilized by playing the first 5 minutes of the IEC SDR test clip multiple times until the average power level between successive runs of the clip is within 2 percent. The procedure specifies that final camera configuration is performed just before on mode testing so that the UUT remains stabilized during the transition from this step to on mode testing. DOE proposes to reference Section 10 of ANSI/CTA-2037-C in appendix H to specify the UUT and camera photometer stabilization requirements.

Section 11.1 of ANSI/CTA-2037-C specifies the on mode test conduct, which as discussed, specifies measuring power consumption and dynamic luminance simultaneously. ANSI/CTA-2037-C specifies conducting on mode testing in the SDR default, SDR brightest, and HDR10 default preset picture settings. All UUTs are tested with ABC off at the default backlight in each preset picture setting. Any preset picture setting with ABC off by default is additionally tested with the backlight level set to 20 percent of its maximum backlight level. Any preset picture setting with ABC on by default is additionally tested at 140 lux, 50 lux, 17 lux, and 4 lux room illuminance levels. These room illuminance levels are not identical, but are in practice equivalent, to the room illuminance levels specified in the current appendix H (*i.e.*, 100 lux, 35 lux, 12 lux, and 3 lux) for the following reason. Appendix H requires the lamp to be placed directly in front of the ABC sensor to set room illuminance levels at 100 lux, 35 lux, 12 lux, and 3 lux. Given that ANSI/CTA-2037-C specifies the lamp to be placed at an angle of 45° from the ABC sensor, the room illuminance levels are slightly higher to ensure that the light at the ABC sensor is equivalent to the current room illuminance values.

DOE proposes to reference these requirements for the on mode power and luminance measurements in the default SDR, brightest SDR, and default HDR10 preset picture settings. However, for the brightest SDR preset picture setting, DOE proposes to only utilize the on mode power consumption with ABC disabled for the calculation of AEC, regardless of the default ABC setting. This is because the selection of the brightest preset picture setting is done with ABC disabled (as discussed in section III.F.4 of this document). If ABC were then enabled during the on mode measurement test, it would be inconsistent with how the preset picture setting was selected and may not truly capture the intended brightest preset picture setting's luminance and power.

DOE requests comment on its proposal to reference Section 10 of ANSI/CTA-2037-C for the camera photometer and stabilization requirements.

DOE also requests comment on its proposal to reference Section 11.1 of ANSI/CTA-2037-C, for the on mode dynamic luminance and power measurement. Specifically, DOE requests comment on using the brightest preset picture setting measurement with ABC turned off for the AEC calculation, regardless of its default setting.

2. Luminance Test

Section 7.2 of appendix H specifies the procedures for measuring the luminance of the UUT by playing the static IEC 3-bar, black-and-white image and measuring the instantaneous luminance. As discussed, ANSI/CTA-2037-C specifies measuring the dynamic luminance concurrently with on mode power consumption in each preset picture setting utilizing a camera photometer, which provides more representative results compared to a single instantaneous luminance. As such, DOE is proposing to reference

ANSI/CTA-2037-C for the on mode power consumption and dynamic luminance measurement, as discussed in section III.G.1 of this document. Therefore, DOE proposes to remove the separate luminance test currently specified in section 7.2 of appendix H.

3. Standby Mode Test

Section 7.3 of appendix H specifies the procedures for measuring the power consumption of TVs in standby mode, which encompasses standby-passive mode and standby-active, low mode.

For conducting these tests, appendix H specifies using the methodology prescribed in Section 5.3.1 of IEC 62301 Ed. 2.0, which states that standby mode power consumption shall be determined using one of three methods – sampling method, average reading method, or direct meter reading method. Specifically, IEC 62301 Ed. 2.0 specifies that the UUT must be energized for not less than 15 minutes; data recorded in the second two-thirds of the total test duration is used to determine stability. For input powers less than or equal to 1 watt, stability is established when a linear regression through all power readings for the second two thirds of the data has a slope of less than 10 milli-watts per hour (“mW/h”) for input powers of more than 1 watt, stability is established when a linear regression through all power readings for the second two thirds of the data has a slope of less than 1 percent of the measured input power per hour. The test duration is extended up to a maximum of 3 hours until the stability criteria are met. If stability cannot be achieved within 3 hours, IEC 62301 Ed. 2.0 specifies assessing the raw data for periodic or cyclic patterns to meet different criteria specific to cyclic or irregular power consumption patterns. IEC 62301 Ed. 2.0 also specifies additional requirements for different scenarios, such as modes with cycle, non-cyclic, unstable, or irregular power consumption.

In response to the June 2016 RFI, NRDC and ASAP and NEEP recommended that the standby mode test be performed while the TV is connected to a live internet signal during testing and not just to LAN, as is currently required. NRDC and ASAP and NEEP also recommended that the standby test duration be extended. (NRDC, No. 2 at pp. 16–17; ASAP and NEEP, No. 6 at p. 1) CA IOUs recommended that network connectivity be enabled in standby and on mode testing. (CA IOUs, No. 8 at p. 5)

Section 11.2 of ANSI/CTA-2037-C specifies the procedures for performing the standby mode test. As part of the overall setup and configuration requirements, the UUT is connected to WAN, and up to three devices (*i.e.*, smart speaker, mobile device, and network traffic generator) are connected to the same LAN, as discussed previously in section III.F.6 of this document. Section 11.2 of ANSI/CTA-2037-C specifies that the standby-active and standby-passive measurements shall be conducted by powering down the UUT from the SDR default preset picture setting configuration. After the UUT is powered down, power consumption is measured at intervals of 1 second or shorter, and the test concludes when the cumulative average of all data points taken in the last third of the measurement period falls within ± 1 percent or ± 10 milliwatts (“mW”) of the average of the last two thirds of the total measurement period. The total measurement period cannot be less than 60 minutes nor greater than 240 minutes. The standby power measurement is the average power reading during the last two thirds of the total measurement period. If a UUT does not meet the stability criteria at the end of 240 minutes, ANSI/CTA-2037-C specifies reviewing the power trace for any signs of unusual behavior, such as an automatic update, and requires repeating the test if atypical behavior was observed. Depending on the network capabilities of the UUT, the measurement

performed during the standby test is recorded as either a standby-active mode²¹ measurement or a standby-passive mode²² measurement.

Accompanying the standby mode test, Section 9.11 of ANSI/CTA-2037-C additionally requires a series of “wake” commands to be sent from the specified networking devices to the TV to verify that the TV is properly connected to the LAN and properly configured to communicate with other devices on the network. As discussed in section III.F.6 of this document, Section 9.11 of ANSI/CTA-2037-C specifies how to wake the TV using three possible wake commands: wake-by-remote-control-app (WbRA), wake-on-cast (WoC), or wake-by-smart-speaker (WbS). To start the test, the UUT is first powered down for 5 seconds and then powered on via one of the three wake commands according to the following hierarchy: WbS if available, otherwise WoC, otherwise WbRA (hereafter referred to as the “5-second check test”). The standby test is then performed, as described in the previous paragraph. Subsequently, at the end of the standby mode test, the TV must be woken using the same hierarchy as was used during the initial 5-second check test.

For CTA-2037-D, the CTA working group is considering certain revisions to the test method for measuring power consumption in standby mode. The following paragraph enumerates the revisions under consideration for the standby mode test.

²¹ Section 5.1 of ANSI/CTA-2037-C defines standby-active mode as a partial on mode power mode in which the UUT is connected to an external power source and does not provide picture or sound. The UUT can be switched into another power mode with the remote control unit, an internal signal, or an external signal.

²² Section 5.1 of ANSI/CTA-2037-C defines standby-passive mode as a partial on mode power mode in which the UUT is connected to an external power source and does not provide picture or sound. The UUT can be switched into another power mode with the remote control unit or an internal signal, but not with an external signal.

First, the working group is considering removing the requirement that the UUT must be woken using the smart wake devices at the end of the standby mode test. Instead, the 5-second check test is performed only once when the UUT is first powered down for 5 seconds. If any or all of the configured smart wake features fail the 5-second check test, then they must remain configured for the duration of the test. Additionally, the working group is considering three different parameters to record the standby mode power consumption, depending on the level of functionality provided by the UUT in standby mode. For UUTs with at least one smart wake feature enabled, the power consumption is recorded as 'partial on mode power with smart wake enabled'. For UUTs with no advertised or enabled smart wake features, the power consumption is recorded as 'partial on mode power with internet connection' and for non-internet connected UUTs, the power consumption is recorded as 'partial on mode power without internet connection'. Finally, the working group is considering removing the wake time test provisions since this measurement is not repeatable because it is dependent on how the TV is woken.

The working group contended that the requirement to wake the UUT using the smart wake functionality at the end of the standby mode test would not be repeatable because some TVs can be woken only at certain times when in standby mode. For such TVs, the standby mode power consumption cycles between a high power state (*e.g.*, 15 watts) and a low power state (*e.g.*, 1-2 watts). Depending on when the wake command is issued to the TV, the smart wake feature may successfully wake the UUT (*e.g.*, if the command is sent when the TV is in the high power state) or it may not wake the UUT (*e.g.*, if the command is sent when the TV is in the low power state). This could impact the repeatability of the test. However, DOE is concerned that if a TV cannot be

consistently woken at the end of standby mode, the measurement would not be representative of real-world use.

Additionally, during round robin testing, DOE observed challenges in powering on certain TV models using the network connected devices. For one model specifically, the 5-second check test conducted before the start of standby testing yielded inconsistent results—sometimes requiring multiple wake commands to turn on the unit with the smart speaker or mobile device. DOE repeated the standby test at least four times and made the following observations. First, the UUT could be woken using smart wake functions only one time. It is likely that this wake command aligned with when the TV was in a high-power state while others were in a low-power state. Second, the average power consumption of the four tests, measured over a 40 minute test duration was 3.5 watts, 6.9 watts, 10.3 watts, and 11 watts. This shows significant variation between the results, even though the UUT was configured to wake with smart wake features each time. It is possible that the average power over a longer duration, as is specified in ANSI/CTA-2037-C, would lead to more repeatable results.

Overall, DOE notes that in some instances neither the standby mode measurement nor the wake test were repeatable. Lacking additional data, DOE proposes to reference the requirement specified in ANSI/CTA-2037-C, which specifies that the wake test must be performed at the end of the standby mode measurement.

DOE requests stakeholders to provide any additional data and information regarding the repeatability of the standby mode test when connected to smart wake functions, the ability to consistently wake the UUT using smart wake functionality, and

the representativeness of the standby mode test, if a wake test is not included at the end of the standby mode duration.

Accordingly, DOE proposes to reference Section 9.11 of ANSI/CTA-2037-C for the instructions to wake the UUT from standby mode using network connected devices, and Section 11.2 of ANSI/CTA-2037-C to conduct the standby mode test. Specifically, DOE proposes that at the end of the standby mode test, the UUT must be woken using the smart wake features (as is specified in Section 9.11 of ANSI/CTA-2037-C) in the following order of preference: wake-by-smart-speaker, wake-on-cast, and wake-by-remote-control-app. If the UUT can be powered on using any one of these methods, its standby mode power should be recorded as ‘standby power with smart wake enabled’. However, if the UUT cannot be powered on using any of the three specified methods either during the 5-second check test or at the end of the standby mode test, the measured standby mode power consumption would be recorded as ‘standby power with internet connection and without smart wake enabled’.

Similarly, DOE proposes that if the UUT was powered on during the 5-second check test but is unable to be powered on via any of the network connected devices at the end of the standby mode test, the measured power consumption would be recorded as ‘standby power with internet connection and without smart wake enabled’. Additionally, TVs that do not have network capability would be required to record the measured standby power consumption as standby-passive mode measurement.

DOE requests comment on its proposal to reference Section 11.2 of ANSI/CTA-2037-C to measure the power consumption in standby mode with some additional

specifications. DOE also requests comment on its proposal to reference Section 9.11 of ANSI/CTA-2037-C for conducting the wake tests at the completion of standby mode.

DOE requests comment on the revisions that are under consideration for the standby mode test by the CTA working group.

DOE requests comment on whether it is appropriate to differentiate the standby mode power consumption of TVs that can be powered on using any of the three specified methods versus those that cannot be powered on using the smart wake features. DOE also requests comment on whether there would be any benefit to differentiating between the power consumption of such TVs. DOE requests comment on whether the parameters ‘standby smart wake’ and ‘standby internet’ are appropriate or if it should consider other parameters, such as ‘standby-active, high’ and ‘standby-active, low’, respectively.

Additionally, as described, Section 11.2 of ANSI/CTA-2037-C specifies that if a UUT does not meet the stability criteria at the end of the 240 minute measurement period, the tester should review the logged data for any signs of unusual behavior, like that associated with the TV performing an automatic update, and redo the test if atypical behavior was observed. DOE notes that Section 11.2 of ANSI/CTA-2037-C does not provide instruction for how to proceed if review of the logged data does not show any signs of unusual behavior.

During its testing of TVs, DOE has observed that some TVs do not meet the stability criteria after 240 minutes despite not exhibiting any unusual behavior. Furthermore, some models did not achieve stability as defined by ANSI/CTA-2037-C even after significantly extended test durations (*e.g.*, 24 hours, 48 hours, 76 hours, etc.). Observation of the logged power data on such TVs indicates that the TVs fluctuate

between a low power consumption range and a high power consumption range, but that this fluctuation is not cyclic or periodic (*i.e.*, it does not have an observable pattern). It is likely that such TVs are performing background activity at irregular intervals during standby mode, which results in fluctuations in the average power consumption that exceed the narrow bounds of the stability criteria.

To accommodate TVs that do not achieve stability after the end of the specified 240 minute measurement period, DOE proposes that the stability requirement is waived if the full 240 minutes conclude without meeting the stability criteria. In such cases, the average power during the last two-thirds of the measurement period would be recorded as the standby-active mode measurement.

Finally, DOE notes that Section 11.2 of ANSI/CTA-2037-C includes instruction to measure the wake time when performing the wake procedure following completion of the standby mode test. The CTA working group is evaluating whether the wake time test should be eliminated from CTA-2037-D. DOE proposes to exclude the measurement of wake time from the DOE test procedure, because DOE tentatively concludes that “wake time” is a performance related feature that does not impact the energy consumption of the UUT.

For TVs that do not meet the stability criteria of the standby mode measurement, DOE requests comment on measuring power consumption for 240 minutes and using the average power consumption over the last two-thirds of the measurement period as the standby-active mode measurement.

4. Off Mode Test

Section 7.4 of appendix H references IEC 62301 Ed. 2.0 for measuring the off mode power consumption of TVs. ANSI/CTA-2037-C specifies the same methodology to measure off mode power consumption as that specified for standby mode (discussed in section III.G.3 of this document). However, for CTA-2037-D, the CTA working group is considering removing an off mode test.

DOE is not proposing a test to measure TV power consumption in off mode and instead proposes to remove the existing off mode test specified in appendix H because TVs generally do not have an off mode that is distinct from standby mode. Even when a TV is powered off using a remote, it typically has some functionality operational to be able to receive a signal from the remote control or other device to turn back on, which meets the definition of standby mode rather than off mode.

DOE requests comment on its proposal to remove the off mode test from appendix H.

H. Calculation of Annual Energy Consumption

Section 8 of appendix H specifies the calculation and rounding requirements for AEC using the on and standby mode power consumption measurements. ANSI/CTA-2037-C does not contain an equivalent section for the calculation of AEC. Therefore, DOE proposes to retain the current AEC calculation requirements in appendix H but proposes certain modifications consistent with the proposed amendments to the on, standby, and off mode tests.

To calculate AEC, DOE first proposes that the average on mode power consumption be calculated as the average of the on mode power in the three preset

picture settings: SDR default, SDR brightest, and HDR10 default. If ABC is enabled for the SDR or HDR10 default preset picture settings, the power consumption at each of the four room illuminance levels would be used to determine the average power consumption of the preset picture setting. The proposed equations below detail the calculation of on mode power consumption and AEC. The proposed calculation of AEC is different from the current calculation in appendix H primarily in the value used for P_{On} . Given that appendix H specifies testing only the default preset picture setting in on mode, P_{On} reflects the average power consumption in that default preset picture setting. However, in this document, DOE proposes testing three preset picture settings for on mode power consumption; therefore, P_{On} would be the average of the power consumption in the tested preset picture settings.

$$P_{On} = (P_{Default} + P_{Brightest} + P_{HDR10})/3$$

Where:

$P_{Default}$ = the measured average power consumption in the default SDR preset picture setting, if ABC is disabled

OR

$$P_{Default} = (P_{Default_140} + P_{Default_50} + P_{Default_17} + P_{Default_4})/4$$

if ABC is enabled by default in the default SDR preset picture setting and,

$P_{Default_140}$, $P_{Default_50}$, $P_{Default_17}$, and $P_{Default_4}$ are the average power consumption values at room illuminance levels of 140, 50, 17, and 4 lux, respectively

$P_{Brightest}$ = the measured average power consumption in the brightest SDR preset picture setting

P_{HDR10} = the measured average power consumption in the default HDR10 preset picture setting, if ABC is disabled

OR

$$P_{\text{HDR10}} = (P_{\text{HDR10_140}} + P_{\text{HDR10_50}} + P_{\text{HDR10_17}} + P_{\text{HDR10_4}})/4$$

if ABC is enabled by default in the default HDR10 preset picture setting and,

$P_{\text{HDR10_140}}$, $P_{\text{HDR10_50}}$, $P_{\text{HDR10_17}}$, and $P_{\text{HDR10_4}}$ are the average power consumption values at room illuminance levels of 140, 50, 17, and 4 lux, respectively

For standby mode, DOE proposes to retain the same hours per day spent in standby mode, but instead of standby-active and standby-passive, as currently specified in appendix H, DOE proposes to use standby power with smart wake, standby power with internet connection, and standby-passive, as specified in section III.G.3 of this document.

Additionally, DOE proposes to retain the AEC equation currently specified in appendix H but to remove the off mode variable. Given the current AEC equation assigns 0 hours to off mode, DOE proposes to retain the same weighting factors for on and standby modes.

The proposed AEC equation is presented below:

$$\text{AEC} = 365 * (P_{\text{on}} * H_{\text{on}} + P_{\text{standby_smart_wake}} * H_{\text{standby_smart_wake}} + P_{\text{standby_internet}} * H_{\text{standby_internet}} + P_{\text{standby_passive}} * H_{\text{standby_passive}})/1000$$

Where:

P_m = power measured in a given mode m (in Watts)

H_m = hours per day spent in mode m

365 = conversion factor from daily to yearly

1000 = conversion factor from watts to kilowatts

And values for H_m are as specified in Table III.2.

Table III.2 Hourly Weightings

	H_{on}	$H_{standby\ smart\ wake}$	$H_{standby\ internet}$	$H_{standby\ passive}$
Standby smart wake	5	19	0	0
Standby internet	5	0	19	0
Standby-passive	5	0	0	19

DOE requests comment on its proposed calculations for the average on mode power consumption and AEC.

I. Test Procedure Costs and Harmonization

1. Test Procedure Costs and Impact

In this NOPR, DOE proposes to amend the existing test procedure for TVs by proposing to reference ANSI/CTA-2037-C to measure on mode dynamic screen luminance and power consumption as well as standby mode power consumption. ANSI/CTA-2037-C has several differences in testing TVs compared to the current test method at appendix H. Key differences include testing three preset picture settings as opposed to a single default picture setting; measuring dynamic screen luminance over the entire duration of the test clip using a camera photometer at the same time as on mode power consumption measurement; using an LED lamp setup at an angle of 45° for testing TVs with ABC enabled by default; and, testing on and standby mode with an active internet connection (*i.e.*, WAN) and additionally connecting the TV to three other devices on LAN to wake the TV from standby mode to on mode. DOE has tentatively determined that these proposed amendments would impact testing costs as discussed in the following paragraphs.

Given the new equipment, setup, and testing requirements specified in ANSI/CTA-2037-C, which DOE is proposing to reference, DOE estimates that TV testing would have a one-time equipment investment cost, a one-time re-testing cost, and additional annual testing costs for the TVs covered by this NOPR.

To determine the potential costs manufacturers would incur due to the proposed test procedure amendments, DOE used data from DOE's publicly available Compliance Certification Database (“CCD”) to estimate the number of unique basic models that are currently covered by the existing DOE test procedures. Based on data from DOE’s CCD, DOE estimated there are approximately 3,346 unique basic models currently on the market. DOE also estimated the amount of time it would take manufacturers to test a single TV unit to the proposed test procedure amendments, as well as the amount of time it currently takes manufacturers to test a single TV unit to the existing DOE test procedures. Table III.3 presents the estimated amount of time a technician would need to spend to test a single TV unit under the existing DOE test procedures and under the proposed test procedure amendments.

Table III.3 Estimated Amount of Time to Test TVs under the Existing DOE Test Procedures and the Proposed DOE Test Procedures

Testing Steps	Units	Existing DOE TP Duration (Min – Max)	Existing DOE TP Duration (Average)	Proposed DOE TP Duration (Min – Max)	Proposed DOE TP Duration (Average)
System Software Updates	<i>minutes</i>	-	-	15	15
Stabilization	<i>minutes</i>	60	60	15 – 20	18
On mode	<i>minutes</i>	10 – 40	25	55 – 110	83
Luminance (Brightest PPS Determination)	<i>minutes</i>	33	33	30 – 45	38
Standby mode	<i>minutes</i>	30	30	20 – 30	25
Setup (before and between tests)	<i>minutes</i>	25	25	65 – 100	83
Total Test Duration	<i>hours</i>	2.6 – 3.1	2.88	3.3 – 5.3	4.37

Based on data from the Bureau of Labor Statistics' (“BLS's”) Occupational Employment and Wage Statistics, the mean hourly wage for an electronics technician is

\$32.84.²³ Additionally, DOE used data from BLS's Employer Costs for Employee Compensation to estimate the percent that wages comprise the total compensation for an employee. DOE estimated that wages make up 70.6 percent of the total compensation for private industry employees.²⁴ Therefore, DOE estimated that the total hourly compensation (including all fringe benefits) of a technician performing the testing is \$46.52.²⁵ Using these labor rates and time estimates, DOE estimated that it would cost TV manufacturers on average approximately \$203.29 to conduct a single test on a TV unit in accordance with the proposed test procedure amendments.²⁶ DOE estimated that this is on average approximately \$69.31 more than TV manufacturers are incurring to conduct a single test on a TV in accordance with the existing DOE test procedures.²⁷

TV manufacturers are required to test at least two units per basic model. Therefore, DOE estimates that it would cost manufacturers approximately \$406.58 per basic model in accordance with the proposed test procedure amendments, if finalized, which is on average approximately \$138.62 more per basic model than TV manufacturers are currently incurring to test a TV basic model. DOE estimated that on average TV models remain on the market for approximately 2 years, before being replaced by newer models. DOE estimates that approximately 75 percent of the models that are currently on the market will remain on the market between the time DOE finalizes a test procedure and when manufacturers are required to use the updated DOE test procedures.²⁸

²³ DOE used the mean hourly wage of the “17-3023 Electrical and Electronic Engineering Technologists and Technicians” from the most recent BLS Occupational Employment and Wage Statistics (May 2020) to estimate the hourly wage rate of a technician assumed to perform this testing. *See* www.bls.gov/oes/current/oes173023.htm. Last accessed on November 8, 2021.

²⁴ DOE used the June 2021 “Employer Costs for Employee Compensation” to estimate that for “Private Industry Workers,” “Wages and Salaries” are 70.6 percent of the total employee compensation. *See* www.bls.gov/news.release/archives/ecec_09162021.pdf. Last accessed on November 8, 2021.

²⁵ $\$32.84 \div 0.706 = \46.52 .

²⁶ $4.37 \text{ hours} \times \$46.52 = \$203.29$.

²⁷ $\$203.29 - (2.88 \text{ hours} \times \$46.52) = \$69.31$

²⁸ Given the estimated 2-year TV model turn-over rate, 25 percent would be expected to be replaced, redesigned, or removed from the market over a 180-day period. See section III.J for a discussion of the compliance date.

Therefore, DOE estimated that approximately 2,510 TV basic models will need to be re-tested in accordance with the proposed DOE test procedure amendments, if finalized.²⁹

Based on the testing cost estimates previously stated, DOE estimated that manufacturers would incur a one-time re-testing cost of approximately \$1,021,000 to re-test all TV basic models remaining on the market, if the proposed test procedure amendments are finalized.³⁰

In addition to these testing costs, DOE assumed that manufacturers would need to purchase camera photometers to conduct the proposed test procedure amendments, if finalized. DOE estimated that a camera photometer costs approximately \$10,000. DOE also estimated that manufacturers would purchase a camera photometer for every 50 TV basic models manufactured, on average. This results in manufacturers purchasing approximately 67 camera photometers, due to the proposed test procedure amendments. DOE estimated manufacturers would incur a one-time cost of approximately \$670,000 to purchase the equipment necessary to conduct the proposed test procedure amendments, if finalized.

Lastly, DOE estimated the additional incremental testing costs of the proposed test procedure amendments, if finalized, compared to the existing DOE test procedures. As previously stated, DOE assumed that each TV basic model would cost approximately \$138.62 more to test to the proposed test procedure amendments, if finalized, than to the existing DOE test procedures. Additionally, as previously stated, DOE estimated there are approximately 3,346 unique TV basic models currently on the market and half of

²⁹ The other 25 percent of models would be replaced with new models between the time DOE finalized a TV test procedure and when manufacturers are required to use the finalized DOE test procedure. These new models would be able to use the updated DOE test procedures. The additional incremental testing costs of the proposed test procedure amendments are addressed later on in this section.

³⁰ $2,510 \text{ models} \times \$406.58 = \$1,020,516$ (rounded to \$1,021,000).

these models are estimated to be replaced or redesigned each year.³¹ Therefore, DOE estimated that approximately 1,673 TV basic models would be introduced into the market each year, which will require testing in accordance with the proposed test procedure amendments, if finalized. DOE estimated that TV manufacturers would incur an additional testing cost of approximately \$232,000 each year due to the additional incremental testing costs of the proposed test procedure amendments, if finalized, over the existing DOE test procedures.³²

DOE requests comment on any aspect of the estimated one-time testing costs, annually additional incremental testing costs, or the estimated equipment costs associated with these proposed test procedure amendments; including the number of TV basic models, the amount of time needed to conduct the proposed test procedure amendments, the amount of time needed to conduct the existing DOE test procedures, or the costs associated with the equipment necessary to conduct the proposed test procedure amendments.

2. Harmonization with Industry Standards

DOE will adopt relevant industry standards as DOE test procedures unless such methodology would be unduly burdensome to conduct or would not produce test results that reflect the energy efficiency, energy use, water use (as specified in EPCA) or estimated operating costs of that product during a representative average use cycle or period of use. Section 8(c) of appendix A of 10 CFR part 430 subpart C. In cases where the industry standard does not meet EPCA statutory criteria for test procedures DOE

³¹ Given the estimated 2-year TV model turn-over rate, 50 percent would be expected to be replaced, redesigned, or removed from the market over a 1-year period.

³² $1,673 \text{ models} \times \$138.62 = \$231,911$ (rounded to \$232,000).

might propose to incorporate by reference the industry standard with certain modifications.

For the TV test procedures at 10 CFR part 430, appendix H, DOE proposes to incorporate by reference ANSI/CTA-2037-C which provides the definitions, test equipment and setup, test conditions, test configuration, and test conduct for measuring TV screen luminance, on mode power consumption, and standby mode power consumption. The industry standard and test clips DOE proposes to incorporate by reference via amendments described in this document are discussed in further detail in section IV.M.

DOE requests comments on the benefits and burdens of the proposed updates and additions to industry standards referenced in the test procedure for TVs.

DOE notes that it is proposing certain modifications to the industry standard it proposes to reference, as follows:

(1) Section 9 of ANSI/CTA-2037-C specifies that the ABC lamp, camera photometer, and the TV unit under test must all be powered from the same specified power supply. DOE proposes that only the TV unit under test must be powered from the specified power supply and the camera photometer and ABC lamp may be powered using standard mains electricity. It is recommended that a unit under test be the only equipment connected to a conditioned power source to prevent any interference in the measured power consumption values from any other equipment connected on the same source. Further, DOE's assessment has shown that powering the ABC lamp and camera photometer directly from the mains electricity does not impact the measured power consumption values.

(2) Section 11.2 of ANSI/CTA-2037-C specifies the test to measure standby mode power consumption and wake time. DOE is not proposing to include the measurement of wake time. Additionally, DOE is proposing to include additional criteria for recording the standby mode power consumption as standby active mode or standby passive mode depending on the ability of the UUT to maintain network connectivity in standby mode.

J. Compliance Date

EPCA prescribes that, if DOE amends a test procedure, all representations of energy efficiency and energy use, including those made on marketing materials and product labels, must be made in accordance with that amended test procedure, beginning 180 days after publication of such a test procedure final rule in the *Federal Register*. (42 U.S.C. 6293(c)(2))

If DOE were to publish an amended test procedure, EPCA provides an allowance for individual manufacturers to petition DOE for an extension of the 180-day period if the manufacturer may experience undue hardship in meeting the deadline. (42 U.S.C. 6293(c)(3)) To receive such an extension, petitions must be filed with DOE no later than 60 days before the end of the 180-day period and must detail how the manufacturer will experience undue hardship. (*Id.*)

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

The Office of Management and Budget (“OMB”) has determined that this test procedure rulemaking does not constitute “significant regulatory actions” under section

3(f) of Executive Order (“E.O.”) 12866, Regulatory Planning and Review, 58 FR 51735 (Oct. 4, 1993). Accordingly, this action was not subject to review under the Executive order by the Office of Information and Regulatory Affairs (“OIRA”) in OMB.

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires preparation of an initial regulatory flexibility analysis (“IRFA”) for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, “Proper Consideration of Small Entities in Agency Rulemaking,” 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel’s website: www.energy.gov/gc/office-general-counsel.

For manufacturers of TVs, the Small Business Administration (“SBA”) has set a size threshold, which defines those entities classified as “small businesses” for the purposes of the statute. DOE used the SBA’s small business size standards to determine whether any small entities would be subject to the requirements of the rule. (*See* 13 CFR part 121.) The size standards are listed by North American Industry Classification System (“NAICS”) code and industry description and are available at www.sba.gov/document/support--table-size-standards. Manufacturing TVs is classified under NAICS 334220, “radio and television broadcasting and wireless communications

equipment manufacturing.” The SBA sets a threshold of 1,250 employees or fewer for an entity to be considered as a small business for this category.

DOE has recently conducted a focused inquiry into small business manufacturers of the products covered by this rulemaking. DOE used available public information to identify potential small manufacturers. DOE accessed the Compliance Certification Database³³ to create a list of companies that import or otherwise manufacture the products covered by this proposal. DOE identified 33 unique companies that manufacture TVs sold in the U.S. All of these companies have more than 1,250 employees or are fully owned and operated outside the United States.

Therefore, DOE initially concludes that the impacts of the proposed test procedure amendments proposed in this NOPR would not have a “significant economic impact on a substantial number of small entities,” and that the preparation of an IRFA is not warranted. DOE will transmit the certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the Small Business Administration for review under 5 U.S.C. 605(b).

C. Review Under the Paperwork Reduction Act of 1995

Manufacturers of covered products must certify to DOE that their products comply with any applicable energy conservation standards. To certify compliance, manufacturers must first obtain test data for their products according to the DOE test procedures, including any amendments adopted for those test procedures. DOE has established regulations for the certification and recordkeeping requirements for certain covered consumer products and commercial equipment. (*See generally* 10 CFR part 429)

³³ U.S. Department of Energy Compliance Certification Management System, available at: www.regulations.doe.gov/ccms.

The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (“PRA”). This requirement has been approved by OMB under OMB control number 1910-1400. Public reporting burden for the certification is estimated to average 35 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

There is currently no energy conservation standard for TVs. As such, if finalized, the test procedure proposed would not establish a reporting requirement. In the event DOE proposes an energy conservation standard for TVs with which manufacturers must demonstrate compliance, DOE will seek OMB approval of the associated information collection requirement. DOE will seek approval either through a proposed amendment to the information collection requirement approved under OMB control number 1910-1400 or as a separate proposed information collection requirement.

Notwithstanding any other provision of the law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the PRA, unless that collection of information displays a currently valid OMB Control Number.

D. Review Under the National Environmental Policy Act of 1969

In this NOPR, DOE proposes test procedure amendments that may be used to develop and implement future energy conservation standards for TVs. DOE has determined that this rule falls into a class of actions that are categorically excluded from review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*)

and DOE's implementing regulations at 10 CFR part 1021. Specifically, DOE has determined that adopting test procedures for measuring energy efficiency of consumer products and industrial equipment is consistent with activities identified in 10 CFR part 1021, appendix A to subpart D, A5 and A6. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

E. Review Under Executive Order 13132

Executive Order 13132, "Federalism," 64 FR 43255 (Aug. 4, 1999) imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have federalism implications. The Executive order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. DOE has examined this proposed rule and has determined that it would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of this proposed rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297(d)) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

Regarding the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, “Civil Justice Reform,” 61 FR 4729 (Feb. 7, 1996), imposes on Federal agencies the general duty to adhere to the following requirements: (1) eliminate drafting errors and ambiguity, (2) write regulations to minimize litigation, (3) provide a clear legal standard for affected conduct rather than a general standard, and (4) promote simplification and burden reduction. Section 3(b) of Executive Order 12988 specifically requires that executive agencies make every reasonable effort to ensure that the regulation (1) clearly specifies the preemptive effect, if any, (2) clearly specifies any effect on existing Federal law or regulation, (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction, (4) specifies the retroactive effect, if any, (5) adequately defines key terms, and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires executive agencies to review regulations in light of applicable standards in sections 3(a) and 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, the proposed rule meets the relevant standards of Executive Order 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (“UMRA”) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Pub. L. 104-4, sec. 201 (codified at 2 U.S.C. 1531). For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private

sector of \$100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed “significant intergovernmental mandate,” and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820; also available at www.energy.gov/gc/office-general-counsel. DOE examined this proposed rule according to UMRA and its statement of policy and determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure of \$100 million or more in any year, so these requirements do not apply.

H. Review Under the Treasury and General Government Appropriations Act, 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105-277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This proposed rule would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review Under Executive Order 12630

DOE has determined, under Executive Order 12630, “Governmental Actions and Interference with Constitutionally Protected Property Rights” 53 FR 8859 (March 18,

1988), that this proposed regulation would not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

J. Review Under Treasury and General Government Appropriations Act, 2001

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). Pursuant to OMB Memorandum M-19-15, Improving Implementation of the Information Quality Act (April 24, 2019), DOE published updated guidelines which are available at <https://www.energy.gov/sites/prod/files/2019/12/f70/DOE%20Final%20Updated%20IQA%20Guidelines%20Dec%202019.pdf>. DOE has reviewed this proposed rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OMB, a Statement of Energy Effects for any proposed significant energy action. A "significant energy action" is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that (1) is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed

statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

The proposed regulatory action to amend the test procedure for measuring the energy efficiency of TVs is not a significant regulatory action under Executive Order 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

L. Review Under Section 32 of the Federal Energy Administration Act of 1974

Under section 301 of the Department of Energy Organization Act (Pub. L. 95–91; 42 U.S.C. 7101), DOE must comply with section 32 of the Federal Energy Administration Act of 1974, as amended by the Federal Energy Administration Authorization Act of 1977. (15 U.S.C. 788; “FEAA”) Section 32 essentially provides in relevant part that, where a proposed rule authorizes or requires use of commercial standards, the notice of proposed rulemaking must inform the public of the use and background of such standards. In addition, section 32(c) requires DOE to consult with the Attorney General and the Chairman of the Federal Trade Commission (“FTC”) concerning the impact of the commercial or industry standards on competition.

The proposed modifications to the test procedure for TVs would incorporate testing methods contained in certain sections of the following commercial standard: ANSI/CTA-2037-C. DOE has evaluated this standard and is unable to conclude whether it fully complies with the requirements of section 32(b) of the FEAA (*i.e.*, whether it was

developed in a manner that fully provides for public participation, comment, and review.) DOE will consult with both the Attorney General and the Chairman of the FTC concerning the impact of these test procedures on competition, prior to prescribing a final rule.

M. Description of Materials Incorporated by Reference

In this NOPR, DOE proposes to incorporate by reference the test standard published by CTA, titled “Determination of Television Set Power Consumption,” ANSI/CTA-2037-C.

ANSI/CTA-2037-C is a voluntary industry test procedure that measures on mode TV power consumption in three preset picture settings and standby mode power consumption. The test procedure amendments proposed in this NOPR generally reference ANSI/CTA-2037-C including provisions to address definitions, test equipment and setup, test conditions, test configuration, and test conduct for measuring TV screen luminance, on mode power consumption, and standby mode power consumption. Additionally, the test clips required to measure on mode power consumption are available digitally on CTA’s website. These test clips are available in two formats: SDR and HDR10 and for each format, the test clips are available in two resolutions: SD and HD for the SDR test clip and HD and UHD for the HDR10 test clip.

Copies of ANSI/CTA-2037-C and the test clips may be downloaded from the CTA’s website at <https://shop.cta.tech/products/determination-of-television-set-power-consumption-ansi-cta-2037-c>.

V. Public Participation

A. Participation in the Webinar

The time and date of the webinar are listed in the **DATES** section at the beginning of this document. If no participants register for the webinar, it will be cancelled.

Webinar registration information, participant instructions, and information about the capabilities available to webinar participants will be published on DOE's website:

www.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=61.

Participants are responsible for ensuring their systems are compatible with the webinar software.

B. Submission of Comments

DOE will accept comments, data, and information regarding this proposed rule no later than the date provided in the **DATES** section at the beginning of this proposed rule.³⁴ Interested parties may submit comments using any of the methods described in the **ADDRESSES** section at the beginning of this document.

Submitting comments via www.regulations.gov. The www.regulations.gov web page will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact

³⁴ DOE has historically provided a 75-day comment period for test procedure NOPRs pursuant to the North American Free Trade Agreement, U.S.-Canada-Mexico ("NAFTA"), Dec. 17, 1992, 32 I.L.M. 289 (1993); the North American Free Trade Agreement Implementation Act, Pub. L. 103-182, 107 Stat. 2057 (1993) (codified as amended at 10 U.S.C.A. 2576) (1993) ("NAFTA Implementation Act"); and Executive Order 12889, "Implementation of the North American Free Trade Agreement," 58 FR 69681 (Dec. 30, 1993). However, on July 1, 2020, the Agreement between the United States of America, the United Mexican States, and the United Canadian States ("USMCA"), Nov. 30, 2018, 134 Stat. 11 (*i.e.*, the successor to NAFTA), went into effect, and Congress's action in replacing NAFTA through the USMCA Implementation Act, 19 U.S.C. 4501 *et seq.* (2020), implies the repeal of E.O. 12889 and its 75-day comment period requirement for technical regulations. Thus, the controlling laws are EPCA and the USMCA Implementation Act. Consistent with EPCA's public comment period requirements for consumer products, the USMCA only requires a minimum comment period of 60 days. Consequently, DOE now provides a 60-day public comment period for test procedure NOPRs.

information will not be publicly viewable except for your first and last names, organization name (if any), and submitter representative name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information to contact you. If DOE cannot read your comment due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

However, your contact information will be publicly viewable if you include it in the comment or in any documents attached to your comment. Any information that you do not want to be publicly viewable should not be included in your comment, nor in any document attached to your comment. Persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

Do not submit to *www.regulations.gov* information for which disclosure is restricted by statute, such as trade secrets and commercial or financial information (hereinafter referred to as Confidential Business Information (“CBI”)). Comments submitted through *www.regulations.gov* cannot be claimed as CBI. Comments received through the website will waive any CBI claims for the information submitted. For information on submitting CBI, see the Confidential Business Information section.

DOE processes submissions made through *www.regulations.gov* before posting. Normally, comments will be posted within a few days of being submitted. However, if large volumes of comments are being processed simultaneously, your comment may not be viewable for up to several weeks. Please keep the comment tracking number that *www.regulations.gov* provides after you have successfully uploaded your comment.

Submitting comments via email. Comments and documents submitted via email also will be posted to *www.regulations.gov*. If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information on a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments

Include contact information each time you submit comments, data, documents, and other information to DOE. No faxes will be accepted.

Comments, data, and other information submitted to DOE electronically should be provided in PDF (preferred), Microsoft Word or Excel, or text (ASCII) file format. Provide documents that are not secured, written in English and free of any defects or viruses. Documents should not contain special characters or any form of encryption and, if possible, they should carry the electronic signature of the author.

Campaign form letters. Please submit campaign form letters by the originating organization in batches of between 50 to 500 form letters per PDF or as one form letter with a list of supporters' names compiled into one or more PDFs. This reduces comment processing and posting time.

Confidential Business Information. Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email two well-marked copies: one copy of the document marked confidential including all the information believed to be confidential, and one copy of the document marked non-confidential with the information believed to

be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

It is DOE's policy that all comments may be included in the public docket, without change and as received, including any personal information provided in the comments (except information deemed to be exempt from public disclosure).

C. Issues on Which DOE Seeks Comment

Although DOE welcomes comments on any aspect of this proposal, DOE is particularly interested in receiving comments and views of interested parties concerning the following issues:

- (1) DOE requests comment on its proposal to adopt the substantive provisions of ANSI/CTA-2037-C in appendix H with certain modifications.
- (2) DOE requests comment on defining the identified terms in appendix H through reference to ANSI/CTA-2037-C.
- (3) DOE also requests comment on whether it should consider the revisions to the power mode definitions that are under consideration by the CTA working group for CTA-2037-D.
- (4) DOE requests comment on referencing Section 7.1.1 of ANSI/CTA-2037-C for the power supply requirements. DOE also requests comment on referencing the updated requirements that are under consideration for CTA-2037-D, which would move the voltage and frequency requirements for the power supply from the standby mode to on mode section within Section 7.1.1 of the CTA-2037 standard.

- (5) DOE requests comment on its proposal to connect only the UUT to the specified AC power source during testing and to specify that the camera photometer and ABC lamp may be powered via mains power. DOE also requests feedback on whether the camera photometer and ABC lamp should be connected to additional specified AC power sources and the burden versus benefit of such an approach.
- (6) DOE requests comment on its proposal to reference the power meter requirements from ANSI/CTA-2037-C. Specifically, DOE requests feedback on the potential burden, if any, to meet the more stringent requirements specified in ANSI/CTA-2037-C.
- (7) DOE requests comment on its proposal to measure dynamic screen luminance and to specify use of a camera photometer to measure dynamic screen luminance. In particular, DOE requests comment on any concerns with the burden associated with using a camera photometer as specified by ANSI/CTA-2037-C to measure screen luminance.
- (8) DOE also requests comment on the additional calibration requirement under consideration for CTA-2037-D and whether DOE should include this requirement for its TVs test procedure.
- (9) DOE requests comment on its proposal to reference the illuminance meter requirements, including the calibration requirements, from ANSI/CTA-2037-C.
- (10) DOE also requests comment on the updated illuminance meter requirements under consideration for CTA-2037-D, whether DOE should consider referencing the updated requirements when finalized, and the reason(s) for doing so.

- (11) DOE requests comment on its proposal to reference the media player and USB flash drive requirements from ANSI/CTA-2037-C. DOE also requests comment on whether DOE should maintain the current requirement that the media player and UUT must not be from the same manufacturer.
- (12) DOE requests comment on its proposal to reference Section 7.1.9 of ANSI/CTA-2037-C for the light source required for conducting tests with ABC enabled.
- (13) DOE requests comment on whether the specified ambient temperature and humidity requirements are adequate or whether the temperature and relative humidity specifications should include additional specification regarding the precision and/or accuracy of the instruments used to verify that the required ambient conditions are maintained.
- (14) DOE requests comment on its proposal to reference Section 7.4 of ANSI/CTA-2037-C for the room illuminance level and requirement to position the illuminance meter in the same manner as it would be positioned during luminance and power measurement tests.
- (15) DOE requests comment on its proposal to reference all the requirements specified in Section 8 of ANSI/CTA-2037-C for the test room setup. These include the setup of the UUT, illuminance meter, camera photometer, table surface, and reflective card.
- (16) DOE also requests comment on whether it is appropriate to specify that the table surface must be covered with black, non-reflective cloth or whether DOE should specify a “minimally reflective” cloth instead.
- (17) DOE requests comment on whether it should consider requiring that if a forced menu is displayed requesting the configuration of specific features, then the most energy-consumptive configuration, as represented by AEC,

must be selected (rather than the most power consumptive configuration).

Additionally, if stakeholders support the use of the most power consumptive configuration, DOE requests comment on whether it should specify that the power consumption measurement is averaged over the duration of the test.

(18) DOE additionally requests comment on any approaches that are under consideration for CTA-2037-D by the CTA working group for the initial setup of the TV, the configuration of forced menu options, or the requirements for the quick start wake time measurement test.

(19) DOE requests comment on its proposal to reference the SDR and HDR10 IEC test clips specified in ANSI/CTA-2037-C for testing TVs in the default, brightest, and HDR10 preset picture settings.

(20) DOE requests comment on its proposal to reference the requirements in ANSI/CTA-2037-C for the selection of the preset picture settings that must be used for testing and additionally specifying that the brightest preset picture setting be identified with ABC disabled.

(21) DOE requests information on preset picture settings that can adapt the TV's configuration based on content, usage pattern, environment, etc. DOE also requests comment on whether such preset picture settings should be excluded from testing, even if they are one of the default SDR, brightest SDR, or default HDR10 preset picture settings. If stakeholders support excluding such a preset picture setting from testing, DOE requests comment on which preset picture setting(s) should be used for testing instead, particularly if the intelligent preset picture setting is a default SDR or default HDR10 preset picture setting.

(22) DOE requests comment on its proposal to reference Sections 7.1.8, 9.10, and 9.11 of ANSI/CTA-2037-C for the network configuration requirements.

- (23) DOE also requests comment on the updates being considered by the CTA working group for CTA-2037-D as it pertains to the WAN and LAN connection requirements and the connection requirements for smart wake features.
- (24) DOE requests feedback on its observed challenges with pairing certain TV models with smart speakers, and whether other laboratories have experienced similar challenges configuring smart speakers or any of the other specified networking devices to connect with a TV model.
- (25) DOE also requests comment on whether DOE should consider providing any additional specifications beyond those provided in ANSI/CTA-2037-C, or those being considered for CTA-2037-D, to facilitate establishing the required network connections with additional devices.
- (26) DOE requests comment on its proposal to reference Section 10 of ANSI/CTA-2037-C for the camera photometer and stabilization requirements.
- (27) DOE also requests comment on its proposal to reference Section 11.1 of ANSI/CTA-2037-C, for the on mode dynamic luminance and power measurement. Specifically, DOE requests comment on using the brightest preset picture setting measurement with ABC turned off for the AEC calculation, regardless of its default setting.
- (28) DOE requests stakeholders to provide any additional data and information regarding the repeatability of the standby mode test when connected to smart wake functions, the ability to consistently wake the UUT using smart wake functionality, and the representativeness of the standby mode test, if a wake test is not included at the end of the standby mode duration.
- (29) DOE requests comment on its proposal to reference Section 11.2 of ANSI/CTA-2037-C to measure the power consumption in standby mode with

some additional specifications. DOE also requests comment on its proposal to reference Section 9.11 of ANSI/CTA-2037-C for conducting the wake tests at the completion of standby mode.

(30) DOE requests comment on the revisions that are under consideration for the standby mode test by the CTA working group.

(31) DOE requests comment on whether it is appropriate to differentiate the standby mode power consumption of TVs that can be powered on using any of the three specified methods versus those that cannot be powered on using the smart wake features. DOE also requests comment on whether there would be any benefit to differentiating between the power consumption of such TVs.

(32) DOE requests comment on whether the parameters ‘standby smart wake’ and ‘standby internet’ are appropriate or if it should consider other parameters, such as ‘standby-active, high’ and ‘standby-active, low’, respectively.

(33) For TVs that do not meet the stability criteria of the standby mode measurement, DOE requests comment on measuring power consumption for 240 minutes and using the average power consumption over the last two-thirds of the measurement period as the standby-active mode measurement.

(34) DOE requests comment on its proposal to remove the off mode test from appendix H.

(35) DOE requests comment on its proposed calculations for the average on mode power consumption and AEC.

(36) DOE requests comment on any aspect of the estimated one-time testing costs, annually additional incremental testing costs, or the estimated equipment costs associated with these proposed test procedure amendments; including the number of TV basic models, the amount of time needed to conduct the proposed test procedure amendments, the amount of time needed

to conduct the existing DOE test procedures, or the costs associated with the equipment necessary to conduct the proposed test procedure amendments.

VI. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this notice of proposed rulemaking and request for comment.

List of Subjects

10 CFR Part 429

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Intergovernmental relations, Reporting and recordkeeping requirements, Small businesses.

10 CFR Part 430

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Incorporation by reference, Intergovernmental relations, Small businesses.

Signing Authority

This document of the Department of Energy was signed on February 17, 2022, by Kelly J. Speakes-Backman, Principal Deputy Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the *Federal Register*.

Signed in Washington, DC, on February 22, 2022.

Treena V. Garrett,
Federal Register Liaison Officer,
U.S. Department of Energy.

For the reasons stated in the preamble, DOE is proposing to amend parts 429 and 430 of Chapter II of Title 10, Code of Federal Regulations as set forth below:

**PART 429 -- CERTIFICATION, COMPLIANCE, AND ENFORCEMENT
FOR CONSUMER PRODUCTS AND COMMERCIAL AND INDUSTRIAL
EQUIPMENT**

1. The authority citation for part 429 continues to read as follows:

Authority: 42 U.S.C. 6291–6317; 28 U.S.C. 2461 note.

2. Amend §429.25 by revising paragraphs (a)(2)(ii), and (a)(2)(iii)(A) and (B)

to read as follows:

§429.25 Television sets.

(a) * * *

(2) * * *

(ii) Any represented annual energy consumption of a basic model shall be determined by applying the AEC calculation in section 6.1 of appendix H to subpart B of part 430 of this chapter to the represented values of power consumption as calculated pursuant to paragraph (a)(2)(i) of this section.

(iii) * * *

(A) For power consumption in the on and standby modes, the represented value shall be rounded according to the accuracy requirements specified in section 2.2 of appendix H to subpart B of part 430 of this chapter.

(B) For annual energy consumption, the represented value shall be rounded according to the rounding requirements specified in section 6.2 of appendix H to subpart B of part 430 of this chapter.

* * * * *

PART 430 -- ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

3. The authority citation for part 430 continues to read as follows:

Authority: 42 U.S.C. 6291-6309; 28 U.S.C. 2461 note.

4. Amend §430.3 by:

a. Revising paragraph (a);

b. Redesignating paragraphs (m) through (v) as paragraphs (n) through (w), respectively;

c. Adding new paragraph (m);

d. Removing newly redesignated paragraph (p)(4) and, redesignating newly redesignated paragraphs (p)(5) through (9) as paragraphs (p)(4) through (8), respectively; and

e. Revising newly redesignated paragraph (o)(5);

The addition and revisions read as follows:

§ 430.3 Materials incorporated by reference.

Certain material is incorporated by reference into this subpart with the approval of the

Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51.

To enforce any edition other than that specified in this section, the U.S. Department of Energy (DOE) must publish a document in the Federal Register and the material must be available to the public. All approved material is available for inspection at DOE and at the National Archives and Records Administration (NARA). Contact DOE at: U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Sixth Floor, 950 L'Enfant Plaza SW, Washington, DC 20024, (202) 586-9127, Buildings@ee.doe.gov,

<https://www.energy.gov/eere/buildings/appliance-and-equipment-standards-program>.

For information on the availability of this material at NARA, email:

fr.inspection@nara.gov, or go to: [www.archives.gov/federal-register/cfr/ibr-](http://www.archives.gov/federal-register/cfr/ibr-locations.html)

[locations.html](http://www.archives.gov/federal-register/cfr/ibr-locations.html). The material may be obtained from the sources in the following paragraphs of this section.

* * * * *

(m) CTA. Consumer Technology Association, 1919 S. Eads Street, Arlington, VA 22202, (703) 907-7600, or go to www.cta.tech.

(1) ANSI/CTA-2037-C, *Determination of Television Set Power Consumption*, CTA approved October 2021; IBR approved for appendix H to subpart B.

(2) [Reserved]

* * * * *

(p) * * *

(5) IEC 62301 (“IEC 62301”), Household electrical appliances—Measurement of standby power, (Edition 2.0, 2011-01), IBR approved for appendices C1, D1, D2, F, G, I, J2, N, O, P, Q, X, X1, Y, Z, BB, and CC to subpart B.

* * * * *

5. Amend §430.23 by revising paragraph (h) to read as follows:

§ 430.23 Test procedures for the measurement of energy and water consumption.

* * * * *

(h) *Television sets.* The power consumption of a television set, expressed in watts, including on and standby modes, shall be measured in accordance with sections 5.2 and 5.3 of appendix H of this subpart, respectively. The annual energy consumption, expressed in kilowatt-hours per year, shall be measured in accordance with section 6 of appendix H of this subpart.

* * * * *

6. Revise Appendix H to subpart B of part 430 to read as follows:

Appendix H to Subpart B of Part 430—Uniform Test Method for Measuring the Power Consumption of Television Sets

Note: Before [*date 180 days following publication of a final rule*], any representations made with respect to the energy use or energy efficiency of a television must be based upon results generated under this appendix as it appeared in 10 CFR part 430 edition revised as of January 1, 2021 or this appendix. Beginning [*date 180 days following publication of a final rule*] any representations made with respect to the energy use or efficiency of a television must be based upon results generated under this appendix.

Given that beginning [*date 180 days after publication of a final rule*], representations with respect to the energy use or efficiency of televisions must be made in accordance with tests conducted pursuant to this appendix, manufacturers may wish to begin using this test procedure as soon as possible.

0. Incorporation by Reference

DOE incorporated by reference in §430.3, ANSI/CTA-2037-C in its entirety. However, only enumerated provisions of ANSI/CTA-2037-C are applicable to this appendix, as follows:

0.1 ANSI/CTA-2037-C: Determination of Television Set Power Consumption

- (a) Sections 5.1 and 5.2 as referenced in section 1 of this appendix;
- (b) Sections 7.1.1 through 7.2 as referenced in section 2 of this appendix;
- (c) Sections 7.3 through 8.2 as referenced in section 3 of this appendix;
- (d) Sections 9.1 through 9.11 as referenced in section 4 of this appendix; and
- (e) Sections 10 through 11.2 as referenced in section 5 of this appendix;

1. Definitions and Symbols

1.1. Definitions. The following terms are defined according to Section 5.1 of ANSI/CTA-2037-C.

- (a) Automatic brightness control
- (b) Brightest selectable picture setting
- (c) Default preset picture setting
- (d) Dynamic Luminance
- (e) Energy-Efficient-Ethernet
- (f) Filmmaker Mode
- (g) Forced menu
- (h) HDR10

- (i) High Dynamic Range
- (j) Home configuration
- (k) Hybrid Log Gamma (HLG)
- (l) Illuminance
- (m) Luminance
- (n) Main battery
- (o) Motion-Based Dynamic Dimming
- (p) Neutral density filter
- (q) Off Mode
- (r) On Mode
- (s) Preset picture setting
- (t) Quick start
- (u) Snoot
- (v) Standby-Active Mode
- (w) Standby-Passive Mode
- (x) Wake-By-Remote-Control-App
- (y) Wake-By-Smart-Speaker
- (z) Wake-On-Cast

1.2. *Symbol usage.* The symbols and abbreviations in Section 5.2 of ANSI/CTA-2037-C apply to this test procedure.

2. Test Equipment

2.1. *AC Power Supply.* The AC power supply shall be setup according to the requirements in Section 7.1.1 of ANSI/CTA-2037-C. Additionally, the following requirement is also applicable:

2.1.1. *AC Power Supply Usage.* The AC power supply shall be used to power only the unit under test (UUT). The camera photometer and ABC lamp may be powered by mains electricity.

2.2. *Power Meter.* The power meter shall be setup and used according to the requirements in Section 7.1.2 of ANSI/CTA-2037-C.

2.3. *Illuminance Photometer.* The illuminance photometer shall be setup and used according to Section 7.1.3 of ANSI/CTA-2037-C.

2.4. *Camera Photometer.* The camera photometer shall be setup and used according to Section 7.1.4 of ANSI/CTA-2037-C.

2.5. *Media Player and Storage Device.* The test media shall be stored and displayed using the equipment outlined in Sections 7.1.5, 7.1.6. and 7.1.7 of ANSI/CTA-2037-C.

2.6. *Network-Related Equipment.* The networking equipment shall be setup and used according to Section 7.1.8 of ANSI/CTA-2037-C.

2.7. *ABC Light Source.* The ABC light source shall be setup and used according to Section 7.1.9 of ANSI/CTA-2037-C.

2.8. *Test Signals.* The test signals used for on mode power consumption shall be as specified in Section 7.2 of ANSI/CTA-2037-C.

3. *Test Setup*

3.1. *Environmental Conditions.* The environmental conditions of the test room shall meet the requirements set in Section 7.3 of ANSI/CTA-2037-C.

3.2. *Ambient Light Conditions.* The ambient light conditions of the test room shall meet the requirements set in Section 7.4 of ANSI/CTA-2037-C.

3.3. The UUT and all associated test equipment shall be setup according to Sections 8.1 and 8.2 of ANSI/CTA-2037-C.

4. Test Configuration

4.1. *UUT Firmware Update.* The UUT firmware shall be updated according to the requirements specified in Section 9.1 of ANSI/CTA-2037-C.

4.2. *Initial Setup.* The TV shall be initially setup following the requirements in Section 9.2 of ANSI/CTA-2037-C.

4.3. *Media Provision.* The test media shall be provided according to the requirements in Section 9.3 of ANSI/CTA-2037-C.

4.4. *Sound Level Adjustments.* The sound level of the UUT shall be set according to Section 9.4 of ANSI/CTA-2037-C.

4.5. *Video Aspect Ratio.* The video aspect ratio shall be setup according to Section 9.5 of ANSI/CTA-2037-C.

4.6. *Identification of the Default SDR and HDR10 Preset Picture Settings.* The identification of the default SDR and HDR10 preset picture settings shall be conducted as specified in Section 9.6 of ANSI/CTA-2037-C.

4.7. *Motion-Based Dynamic Dimming.* Motion-based dynamic dimming shall be setup according to Section 9.7 of ANSI/CTA-2037-C.

4.8. *Identification of the Brightest Preset Picture Setting.* The identification of the brightest preset picture setting shall be conducted using Section 9.8 of ANSI/CTA-2037-C. Additionally, ensure that ABC is disabled while identifying the brightest preset picture setting.

4.9. *Quick Start.* Quick start shall be configured and setup according to Section 9.9 of ANSI/CTA-2037-C.

4.10. *Network Connections.* Network connections shall be configured as specified in Section 9.10 of ANSI/CTA-2037-C.

5. *Test Conduct.*

5.1. *Camera Configuration and UUT Stabilization.* Before testing is conducted the UUT and camera photometer shall be setup and stabilized according to Section 10 of ANSI/CTA-2037-C.

5.2. *On Mode Test.* Conduct the on mode test according to Section 11.1 of ANSI/CTA-2037-C, including the following additions, and record power consumption as noted below:

5.2.1. *Default SDR preset picture setting.*

5.2.1.1. Record the average power consumption with ABC off at the default backlight level as $P_{\text{Default_ABCOff}}$.

5.2.1.2. For UUTs with ABC disabled by default in the default SDR preset picture setting, record the average power consumption with ABC off at backlight level set to 20 percent of its maximum level as $P_{\text{Default_ABCOff_20\%backlight}}$.

5.2.1.3. For UUTs with ABC enabled by default in the default SDR preset picture setting, record the average power consumption at 140, 50, 17, and 4 lux as $P_{\text{Default_140}}$, $P_{\text{Default_50}}$, $P_{\text{Default_17}}$, and $P_{\text{Default_4}}$, respectively.

5.2.1.4. Calculate the default SDR preset picture setting average power consumption as follows:

$P_{\text{Default}} = P_{\text{Default_ABCOff}}$ for UUTs with ABC disabled in the default SDR preset picture setting, and

$P_{\text{Default}} = (P_{\text{Default_140}} + P_{\text{Default_50}} + P_{\text{Default_17}} + P_{\text{Default_4}})/4$ for UUTs with ABC enabled in the default SDR preset picture setting.

5.2.2. *Brightest SDR preset picture setting.*

5.2.2.1. Record the average power consumption with ABC off at the default backlight level as $P_{\text{Brightest_ABCOff}}$.

5.2.2.2. For UUTs with ABC disabled by default in the brightest SDR preset picture setting, record the average power consumption with ABC off at backlight level set to 20 percent of its maximum level as $P_{\text{Brightest_ABCOff_20\%backlight}}$.

5.2.2.3. For UUTs with ABC enabled by default in the brightest SDR preset picture setting, record the average power consumption at 140, 50, 17, and 4 lux as $P_{\text{Brightest_140}}$, $P_{\text{Brightest_50}}$, $P_{\text{Brightest_17}}$, and $P_{\text{Brightest_4}}$, respectively.

5.2.2.4. Calculate the brightest SDR preset picture setting average power consumption as $P_{\text{Brightest}} = P_{\text{Brightest_ABCOff}}$.

5.2.3. Default HDR10 preset picture setting.

5.2.3.1. Record the average power consumption with ABC off at the default backlight level as $P_{\text{HDR10_ABCOff}}$.

5.2.3.2. For UUTs with ABC disabled by default in the default HDR10 preset picture setting, record the average power consumption with ABC off at backlight level set to 20 percent of its maximum level as $P_{\text{HDR10_ABCOff_20\%backlight}}$.

5.2.3.3. For UUTs with ABC enabled by default in the default HDR10 preset picture setting, record the average power consumption at 140, 50, 17, and 4 lux as $P_{\text{HDR10_140}}$, $P_{\text{HDR10_50}}$, $P_{\text{HDR10_17}}$, and $P_{\text{HDR10_4}}$, respectively.

5.2.3.4. Calculate the default HDR10 preset picture setting average power consumption as follows:

$P_{\text{HDR10}} = P_{\text{HDR10_ABCOff}}$ for UUTs with ABC disabled in the default HDR10 preset picture setting, and

$P_{\text{HDR10}} = (P_{\text{HDR10_140}} + P_{\text{HDR10_50}} + P_{\text{HDR10_17}} + P_{\text{HDR10_4}})/4$ for UUTs with ABC enabled in the default HDR10 preset picture setting.

5.2.4. Calculation of On Mode Power Consumption. Calculate the on mode power consumption as the average of the power consumption in the default SDR, brightest SDR, and default HDR10 preset picture settings as follows:

$$P_{\text{On}} = (P_{\text{Default}} + P_{\text{Brightest}} + P_{\text{HDR10}})/3$$

Where:

P_{Default} = average power consumption in the SDR default picture setting as specified in section 5.2.1 of this appendix;

$P_{\text{Brightest}}$ = average power consumption in the SDR brightest preset picture setting as specified in section 5.2.2 of this appendix; and

P_{HDR10} = average power consumption in the HDR10 default preset picture setting as specified in section 5.2.3 of this appendix.

5.3. Standby Mode Test. Conduct the standby mode test as specified in Section 11.2 of ANSI/CTA-2037-C and wake the UUT from standby mode as specified in Section 9.11 of ANSI/CTA-2037-C. The following additional requirements are also applicable:

5.3.1. Wake time measurement, as specified in Section 11.2 of ANSI/CTA-2037-C is not required for the purposes of this appendix.

5.3.2. For the initial network connectivity check specified in Section 9.11 of ANSI/CTA-2037-C, if a network capable UUT cannot be powered on via one of the network connected devices after powering down for 5-seconds, then record the measured average power consumption over the entire duration of the standby test as $P_{\text{standby_internet}}$.

5.3.3. At the end of the standby test, power on the UUT as specified in Section 9.11 of ANSI/CTA-2037-C. If a network capable UUT powers on via one of the network connected devices, record the measured average power consumption as $P_{\text{standby_smart_wake}}$. If a network capable UUT does not power on via any of the network connected devices, record the measured average power consumption as $P_{\text{standby_internet}}$. For UUTs without network capability, record the measured average power consumption as $P_{\text{standby_passive}}$.

5.3.4. If the UUT does not meet the stability criteria specified in Section 11.2 of ANSI/CTA-2037-C at the end of the standby mode test duration of 240 minutes, average the power consumption during the last two-thirds of the measurement period and record this value as the standby power measurement using the variables as defined in section 5.3.3 of this appendix.

6. Calculation of Annual Energy Consumption

6.1. *Calculation.* The annual energy consumption (AEC) of the TV shall be calculated using on and standby mode power consumption values as determined pursuant to sections 5.2 and 5.3, respectively, of this appendix as follows.

$$AEC = 365 * (P_{on} * H_{on} + P_{standby_smart_wake} * H_{standby_smart_wake} + P_{standby_internet} * H_{standby_internet} + P_{standby_passive} * H_{standby_passive})/1000$$

Where:

P_{on} = average on mode power consumption as calculated in section 5.2 of this appendix;

H_{on} = hours per day spent in on mode as specified in Table 1 of this appendix;

$P_{standby_smart_wake}$ = average standby mode power consumption for UUTs with smart wake capability as calculated in section 5.3 of this appendix;

$H_{standby_smart_wake}$ = hours per day spent in standby mode for UUTs with smart wake capability as specified in Table 1 of this appendix;

$P_{standby_internet}$ = average standby mode power consumption for UUTs with network capability without smart wake capability as calculated in section 5.3 of this appendix;

$H_{standby_smart_wake}$ = hours per day spent in standby mode for UUTs with network capability without smart wake capability as specified in Table 1 of this appendix;

$P_{standby_passive}$ = average standby mode power consumption for UUTs without network capability as calculated in section 5.3 of this appendix;

$H_{standby_passive}$ = hours per day spent in standby mode for UUTs without network capability as specified in Table 1 of this appendix;

365 = conversion factor from daily to yearly; and

1000 = conversion factor from watts to kilowatts

Table 1 Hourly Weightings

	H_{on}	$H_{standby_smart_wake}$	$H_{standby_internet}$	$H_{standby_passive}$
Standby smart wake	5	19	0	0
Standby internet	5	0	19	0
Standby-passive	5	0	0	19

6.2. *Rounding*. The calculated AEC value shall be rounded as follows:

6.2.1. If the calculated AEC value is 100 kWh or less, the rated value shall be rounded to the nearest tenth of a kWh.

6.2.2. If the calculated AEC value is greater than 100 kWh, the rated value shall be rounded to the nearest kWh.

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